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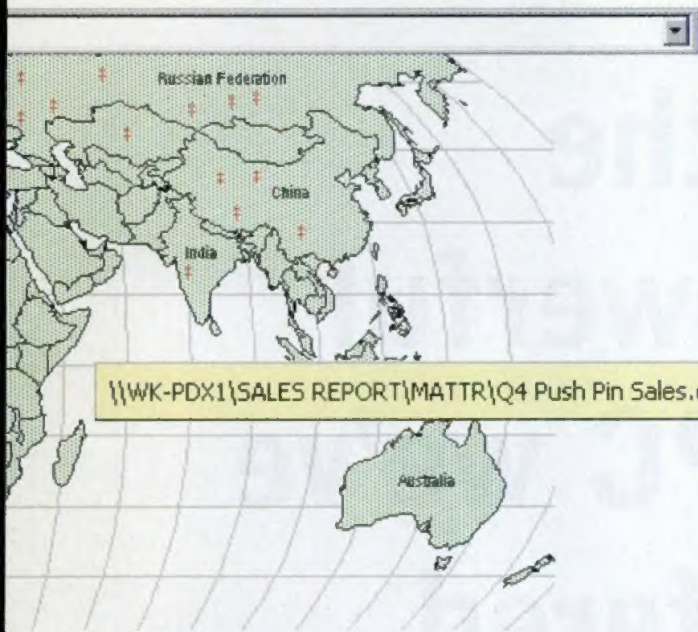
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desktop PC anyone's
ever offered.**



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The Anatomy of a Bug



If you are the editor of a major computer publication and you are aware of a bug in a software product, is it more important to alert users to the problem or to help the vendor fix the problem? That's a question I've

been asking myself since we first became entangled in a complicated story about a security hole in Netscape Navigator.

One morning not too long ago, we received a phone call from Steve Young, a reporter from CNNfn. He said that CaboComm, a Danish company, had found a security hole in Netscape Navigator and wanted us to confirm it at PC Magazine Labs.

That afternoon, he came over and put PC Magazine Labs' technical director Larry Seltzer in contact with a CaboComm employee. To verify the bug, Larry and a CNN employee created a text file on a test computer and used Navigator 3.01 to connect to CaboComm's site. They told the CaboComm employee the name of the file; the employee was able to read the contents of the file back to them on the phone.

We determined that this was indeed a serious security breach. It had apparently existed in every version of Navigator since Version 2.0, released a year and a half ago, and no one else had reported it in the interim.

CaboComm had let Netscape know about the hole earlier that week, but not in detail, and Netscape had offered the company the standard \$1,000 under its "Bugs Bounty" program. Larry learned that the CaboComm employee thought \$1,000 wasn't sufficient compensation for all the work CaboComm's engineers put into isolating the problem, and that CaboComm wanted to go public with the story.

After CNNfn and PC Magazine Online reported the story, the controversy started. First a Netscape official accused CaboComm of "terrorism" for its monetary demand and *PC Magazine* of aiding the company by refusing to reveal any information about the bug to Netscape. Some news outlets reported that we had signed a nondisclosure agreement saying we wouldn't help Netscape provide a fix. In fact, we had agreed not to reveal any information until CNNfn went on the air that evening, and

not to make public the technical specifics of the glitch.

Shortly after CNNfn and PC Magazine Online broke the news, Larry sent Netscape a cache file from our test system in order to get the company's reaction. He suspected that the file would help Netscape fix the hole, and it did. But when Netscape reported having found the problem, a spokesperson said Netscape

found it by examining our computers. This was reported, and again the information was not quite true.

Obvious questions come to mind.

Should we have agreed not to disclose information to Netscape about the bug before it was public knowledge, if that's what it took to get the story? We don't want to encourage people to break into other people's systems, but reporting a bug helps users—our readers—to know that a problem exists. Our first responsibility is to our readers. The choice to us was obvious.

Should companies pay for bug reports, and if so, should people who find bugs be able to negotiate for more money? There is no right or wrong answer. We live in a capitalistic society where individuals and companies have to worry about survival. Users are better off if such problems are disclosed and fixed as soon as possible, so do we really care if the finder of the bug profits?

Should users shy away from Netscape Navigator or Communicator because of the hole? No. Other holes have been reported and will continue to be reported. Security over the Internet may not be perfect, but it's already better than handing your credit card to a merchant or giving the number to someone over the phone.

Finally, is reporting a security hole inviting more abuse and malicious actions? Since the story ran, our mailboxes have been flooded with reports of bugs and "security holes"—some real, most not. In general, we feel we performed a service to you, our readers, by informing you of the flaw.


MICHAEL J. MILLER

HOT MAMA THE PRE MADONNA OF A LOTTA EAT MY SHORTS AND ELEPHANT SNORTS.

The headline makes absolutely no sense. Neither does buying NT PCs for mission critical, complex applications. Especially when the new Sun Ultra™ workstations perform compute intensive, high-end graphics and 3D design with a speed and efficiency never before seen. So you get products out the door with a speed and efficiency never before seen. (Check specs below and then come back here, please.) For more information on the full line of new Sun Ultra workstations, visit us at www.sun.com/u-pcmag



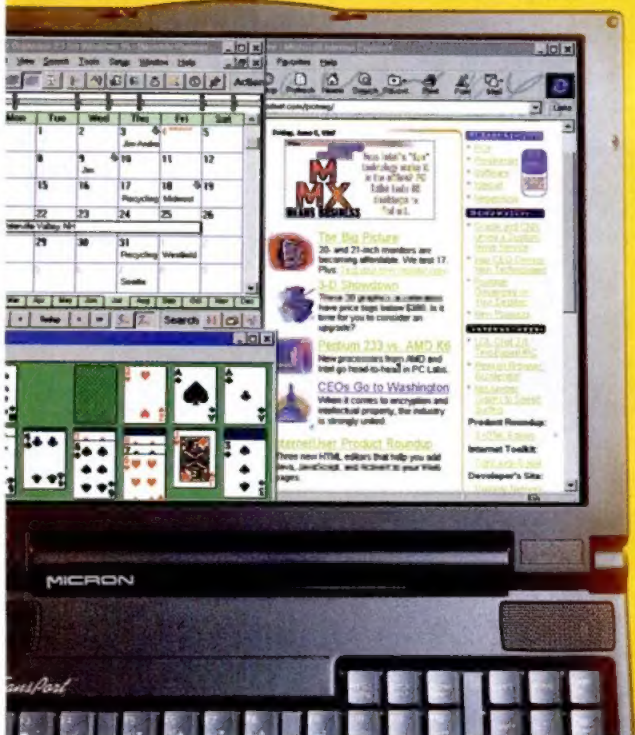
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- 300Mhz RISC processor upgradable to dual processors.
- 2MB cache per processor for faster performance (the fastest NT PCs only have .5MB cache memory per processor).
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PORTABLE DESKTOPS



SPECIAL PULLOUT SECTION

Road Warrior Guide

Don't leave your home or office without it. Here's our summer 1997 update to Bill Howard's invaluable compendium of things to remember as you hit the road.



BY BILL HOWARD Shopping for a new portable PC? Good timing. In this review of the latest wave of 60 notebook PCs, we see many signs of their bridging the gap between the desktop and the portable. Many professionals already live on their portables; the majority of notebooks sold today replace rather than complement desktop PCs. These newest systems make the move even more enticing—with 13-inch LCDs, 3GB hard disks, and performance that's pretty darned good compared with desktop units.....100

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Notebook Notes

Join us online for an interactive version of our evaluation of notebook PCs. What matters most to you? Battery life? Price? Weight? By sorting our interactive summary of features and interactive benchmark test results, you'll be able to zero in on the notebook that will make the perfect companion for your travels.

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BY WAYNE KAWAMOTO

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PORTABLE PROJECTORS

Lighter & Brighter

BY ALFRED POOR Forget overhead transparencies, expensive 35-mm slides, and flip charts. We tested 13 self-contained portable projectors that connect directly to your notebook PC and do a great job of making you look good248



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Think Globally, Surf Locally

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AFTER HOURS

Sci-Fi Standouts?

BY MICHAEL E. RYAN *Star Wars* fans, man your starfighter and fly into one of those dog-fights. For Trekkies, it's a red alert. But don't beam up or go over to the dark side yet. More games based on these classics are replicating to a store near you soon (on the third rock)431



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- Interactive reviews of the best hardware accessories
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is the OCR that came with your scanner. They give you basic OCR.

How to Improve Your OCR Accuracy and Save Big \$\$\$

Caere Corporation (NASDAQ: CAER) recently announced an upgrade package that makes the OmniPage Pro optical character recognition (OCR) engine software available for an estimated street price of only \$129. This provides an inexpensive way for scanner users to step up to fully-featured OCR products (including those bundled with flatbed and edge feed scanners) even upgrade to the full version of OmniPage Pro at a \$30 mail-in rebate.

OmniPage Pro has a separate upgrade package available through the Computer City, Egghead, and Best Buy. Since the vast majority of Caere OCR, most scanner users are eligible to upgrade at this great price.

The large number of scanner manufacturers that bundle Caere OCR (Microtek, Canon, Plustek, Umax, Nikon, Agfa, Logitech, Raytek) are eligible for the upgrade.

The upgrade program includes OmniPage Pro 6.0 (Windows 3.1 and 7.0) (Windows 95), which offer all the capabilities of the bundled versions for extended functionality. Most notable among them are high-resolution "zoning" and preprocessing of scanned images, verification of page technology for the retention of the original page formatting, such as OCR training and deferred processing capabilities.

The Changing OCR Market: In the not so distant past, OCR required expensive and OCR software that was often difficult to use and provided. These issues were frustrating and limited the use of OCR to high-volume vertical markets. The use of desktop OCR was limited to the "early adopters."

"Today, several trends are contributing to the widespread use of OCR," said Chad Kinzelberg, Caere's vice president of marketing. "The program is another major factor that will promote the use of OCR. The occasional OCR user will find Caere software more attractive because of the ease of use and the price point, even the occasional find Caere software use it is so cost effective."

Analysts following the OCR market agree that OCR use is on the rise and industry trends promoting its mainstream adoption:

Higher Customer Awareness: An increased number of computer users are realizing the time and money saving benefits it provides.

Higher Scanner Penetration: Scanners prices have dropped drastically in the last few years with many flatbed gray-scale scanners available for under \$500. Also, new products (such as the small-footprint sheet-fed scanners) and multifunction devices have entered the market.

Increased OCR Accuracy: OCR developers have developed high-accuracy OCR technology for increased output. The greatest improvement has been made on degraded and hard to read documents.

How to Improve Your OCR Accuracy and Save Big \$\$\$

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Low cost scanners entering the market have helped push OCR use to a new level.

OCR Market:

In the past, OCR required expensive hardware and OCR software that was often difficult to use and provided unsatisfactory results. These issues were frustrating and limited the use of OCR to high-volume vertical markets. The use of desktop OCR was limited to the "early adopters."

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Increased OCR Accuracy:

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Pricing and Availability

OmniPage Pro 7.0 (Windows and Mac) and WordScan Plus 4.0 (Windows) upgrade packages are immediately available at major resellers for an estimated street price of \$129.

The Company:

Caere Corporation, with U.S. headquarters in Los Gatos, Calif. and European headquarters, Caere GmbH, in Munich, Germany, is a leader in OCR technology and desktop document management products. Caere has recently expanded its product line of OCR products.

continued on next page

OmniPage Pro
gives you almost twice the OCR accuracy with the same ease-of-use as OmniPage Limited Edition.

OmniPage Pro
keeps text in its original format and layout, including graphics.

OmniPage Pro
even outputs to HTML.

OmniPage Limited Edition

OmniPage Pro

Upgrade now to faster, more accurate OCR.

Sure, the OmniPage Limited Edition OCR that came with your scanner is good. In fact, that's why scanner makers like HP, Microtek and Agfa chose it above all others.

But if you want greater accuracy, full-throttle speed and a ton of new time-saving features, then it's time you moved up to OmniPage Pro®.

OmniPage Pro employs a new, more powerful OCR engine to recognize poor copies and degraded faxes. It integrates seamlessly with your favorite applications like Word, WordPerfect and more. It even guides you through the OCR process using its AutoOCR Toolbar. All with the simple push of a button.

What's more, you get the advantages of the world's most popular OCR software without learning an entirely new program. So make sure you're getting all the OCR power and accuracy you deserve. Visit a local computer retailer today to get your \$30 mail-in rebate coupon.



www.caere.com



Now Just \$99
with mail-in rebate.

Key Feature Comparison	OmniPage Pro	OmniPage Limited Edition
Caere's fastest and most accurate OCR engine	✓	
AutoOCR Toolbar™ for easy, one-button OCR processing	✓	
OCR Wizard to guide you through the process	✓	
Integrates with most image editors like Photoshop	✓	
OCR from within your favorite applications	✓	✓
Retains original layout	✓	

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*Suggested price US \$—subject to change. Valid in US & Canada only. Caere, the Caere logo and OmniPage Pro are registered trademarks and AutoOCR Toolbar is a trademark of Caere Corporation. © 1997. All other names are the property of their respective holders.

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Pipeline

Going, Going, Gone

The Web offers all the ingredients necessary for a good auction: a large community of potential buyers, a motivated seller, and instantaneous communication. And that's why auctions of all kinds are sprouting up all over the Internet. Close to 200 of them are already out there.

The most popular auction style is the traditional, or Yankee, auction. An item is put up for sale

Onsale (www.onsale.com), where you can bid on new and refurbished computers and peripherals from major manufacturers. Other major Web auction houses are Cyberswap Online Auction House (www.cyberswap.com), which holds auctions twice a week, and Ebay (www.ebay.com), which adds over 6,000 new items a day. And the Home Shopping Network's brand-new site



with a minimum bid. You place a bid and then wait until the auction closes. If you're the highest bidder, you get an e-mail telling you that you've won. The other major type of online auction is the so-called Dutch, or reverse, auction. In this case, prices drop at regular time intervals until buyers jump in and buy, betting that if they don't, someone else will get the item.

Naturally, the Web offers plenty of sites for computer-related products. One of the largest is

First Auction (www.firstauction.com) offers a smorgasbord of merchandise at discount prices.

Travel packages are also popular items sold at online auctions. At the Electronic Travel Auction site (www.etauction.com), you can bid on vacation packages, individual plane tickets, cruises, and hotel rooms.

The Internet Auction List at www.usaweb.com offers a complete guide to the auction houses on the Web.

Tuning In Web Audio-to-Go

The Web is proving a fertile ground for gadgetry. One of the latest ideas: a recorder that stores 2 hours of audio from the Web and sends it to your car radio via an integrated low-power FM transmitter. What better way for the 84 million people who commute to work or the 50 million people who exercise regularly to make use of downtime?

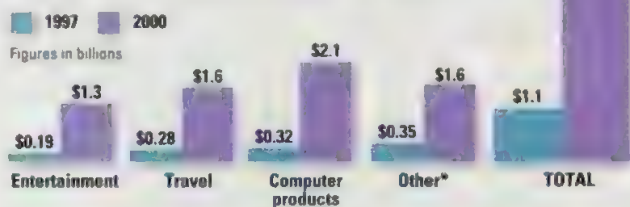
Audible Inc.'s recorder AudibleWords connects to

your PC and downloads programming from the AudibleWords library, to open in September at www.audiblewords.com. You'll find 81 categories of programming, from *The Harvard Business Review* to National Public Radio's series "Car Talk." Competitor Audio Highway (www.audiohwy.com) also offers personalized audio to the mobile market over its Listen Up Player, a handheld digital recorder that downloads Web audio.



Attention, E-Shoppers

Web sales will capture 10 percent of all retail transactions in the next decade, predicts investment firm Bear Stearns. Forrester Research predicts that online shopping will top \$6 billion by 2000.



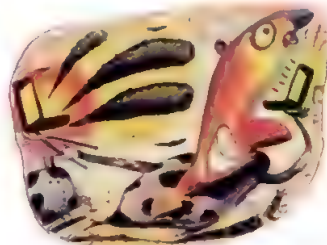
Code Name: Tillamook

The latest buzzword to come out of Intel's Oregon lab is Tillamook, the code name for the upcoming Pentium MMX microprocessor for notebooks. Named after an Oregon hamlet, it's the first chip built on the company's 0.25-micron-process technology. Whereas the current P55C mobile chip reaches only 166 MHz and operates at 2.45 volts, the 1.8-volt Tillamook will likely debut at 200 and 233 MHz sometime this fall. Never before has Intel introduced a new process technology with a mobile chip prior to using the technology on the desktop.

The chip's most salient benefit is a reduction in power and heat. The 0.25-micron process allows

for a core voltage of 1.8, which keeps power dissipation below 6 watts. The 2.45-volt P55C dissipates closer to 8 or 9 watts.

Since the Tillamook die is



much smaller than its forerunner's, Intel can cut more chips from a wafer to reduce manufacturing costs. Intel expects Tillamook notebooks to arrive in the second half of this year.

The Road Warrior's Guide

www.pca.com Going on a business trip or summer vacation? College-bound? Maybe you should bring a new notebook. Check out our interactive online reviews.

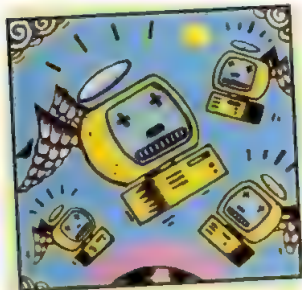
Info Managers Make Life Easier Which little details do you need to track? Find the right program with our interactive summary of features.

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And Don't Miss These Web Extras Daily industry-trends analysis, up-to-the-minute reviews of new Internet products, and the hottest new sites on the Web.

Pipeline



PCs Out to Pasture

When your network manager carts off your 486 system and replaces it with a Pentium, where does the old system end up? Probably in one of two places—a computer-recycling plant or a landfill. Discarded computer and electronics parts make up over 2 million tons of solid waste annually.

With manufacturers introducing upgrades every six months, industry research firm Gartner Group estimates that 75 to 100 million PCs will be retired in 1998. Typically, when an office upgrades its systems, it trades in the old PCs to the manufacturer, which sells them to a recycler and redistributor such as Aurora Electronics.

Aurora resells only 31 percent of the materials it receives as parts, and it sells the remainder to refineries. This process accounts for over 99 percent of the old computers. The remaining 1 percent—sterile ash left over from circuit boards—goes to Aurora's own landfill, where it's mixed with dirt.

Until recently, Aurora conducted its parts redistribution business only over the phone (800-827-0999), but the company's purchase of MicroLine in April indicates a shift to the Web. MicroLine's PowerSource Pro Online (www.microline.com) provides access to the parts inventories of over 300 distributors and offers a "trading floor" that matches sellers with buyers.

There are other options for disposing of unusable systems safely. Because recycling centers classify computers as scrap metal, most will accept your old PC. For healthy machines, there are also plenty of options that will yield a tax-deductible receipt. The PEP National Directory of Computer Recycling (www.microweb.com/pepsite/Recycle/recycle_index.html) lists dozens of organizations that accept donations.

Just Say It

Accurate speech recognition is one of the biggest challenges the software industry has faced, yet it holds the potential to improve our computer interactions radically. Researchers have worked on the complex task since the late 1950s, when it started out as a toy in the labs of companies such as IBM. Big strides have been made since then, and prices have plummeted. In 1992, IBM's speech recognition software for its RS/6000 computer cost \$5,000; IBM recently lowered the price

of its PC software Simply Speaking to \$49.

The next step, natural language understanding, is two or three years away, says David Nahamoo, manager of the human language technologies research division at IBM's Thomas J. Watson Research Center. A prototype in the lab today can book a trip for you. Just tell it you want to go from New York to San Francisco tomorrow after work on a nonstop and return on Friday. Nahamoo is now working out difficulties the system has with spontaneous, unedited speech that's full of "um"s.

All the News, All for Me

Billionaires Larry Ellison and Ted Turner drew a crowd at the Spring Comdex trade show with their announcement of a new Web site from CNN Interactive and Oracle Corp. The site provides users with personalized news on a variety of subjects, and it competes with MSNBC and services such as My Yahoo!

Custom News is a free online clipping service with a personal twist. CNN is providing news for the site, as are more than 100 magazines and other news organizations, many of which cater to specialized interests.

Custom News subscribers fill out a form detailing the subjects that interest them, and the service then delivers cus-

tomized news through personalized Web pages. Ellison and Turner said that local news and the speed of the Oracle database software differentiate the



MY HEADLINES: CNN delivers the news you want to your desktop.

site from other such offerings. But Custom News doesn't update all the stories on a user's page each day, and this approach can make for stale information.

Forecast: Long-Term Growth

Financial analysts at Bear Stearns Technology Group recently voiced an optimistic outlook for technology companies, citing some compelling statistics.

- Only 3 percent of the world's population have access to computers.
- Purchasing a given quantity of present-day computers in 1970 would have cost 283 times as much as today; in 1980, it would have cost 22 times as much; and in 1990, it would have cost a little more than 3 times as much.
- Spending on computers and peripherals accounted for 19.4 percent of capital spending in early 1997, up from 5 percent at the end of the 1980s.
- Every year, 20 to 35 percent of installed computers have to be replaced because of obsolescence.
- Some 50 million people will be logged on to the Web by the end of 1997.



Source: Bear Stearns Technology Group.

Top Retail Business Software

- 1 Microsoft Windows 95 Upgrade Microsoft
- 2 Norton AntiVirus Symantec
- 3 Viruscan McAfee
- 4 First Aid Deluxe CyberMedia
- 5 CleanSweep III Quarterdeck
- 6 Norton Utilities Symantec
- 7 Netscape Navigator Personal Edition Netscape Communications
- 8 Microsoft Office Pro 97 Upgrade Microsoft
- 9 First Aid CyberMedia
- 10 WinFax Pro Symantec

Source: PC Data. Data for May 1997.

THIS ISSUE'S CONTRIBUTORS: Angela Hickman, Toni F. Kistner, Carol Levin, Cade Metz, Sebastian Rupley, and Don Willmott.

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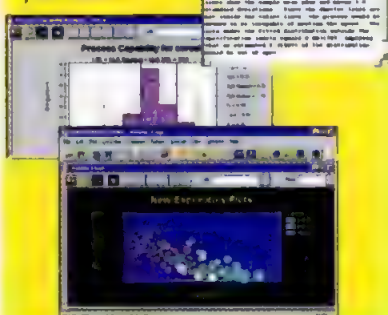
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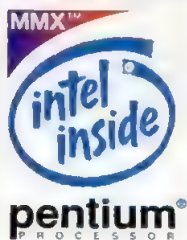


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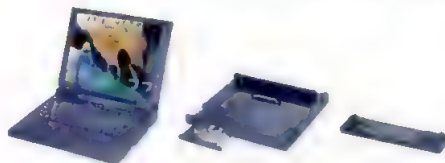


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Letters

MATCHING THE WINSOCKS

Although I found your review of online services ("Online Services: Is It Time to Jump?", May 6, 1997) to be fair and impartial, I did find one error in your review of America Online. You state that Netscape Navigator will not work with AOL for Windows 95 because of the 32-bit Winsock. Would you please explain how I have been using the Navigator over AOL for Windows 95 for months? The 32-bit Winsock used by AOL is Microsoft's own WSOCK32.DLL, which means that if AOL doesn't run Netscape Navigator, there are a whole bunch of other services that it won't run, either.

FRANK BRYANT
via the Internet

At press time our only option was 16-bit Netscape. While you can now use a 32-bit Navigator client, AOL does not offer it from its download pages. You have to get it yourself and install it. Also, you cannot configure AOL to open its Web links in Netscape.—Ed.

In the Summary of Features table you didn't cover the ability to send attachments like Word and Excel files. This nonexistent option in the new CSi 3.0.1 is the reason I'm quitting CompuServe and going with a simple but capable Internet service provider. Moreover, in CSi you can use Internet Explorer to view Web pages, but try and send an e-mail to a hot-linked address in an HTML page and you'll be baffled. CompuServe's configuration doesn't allow this. Thus, many of the terrific e-mail features of Microsoft Office 97's Outlook go unused. My year of waiting for CompuServe to update its service while making its prices competitive is over.

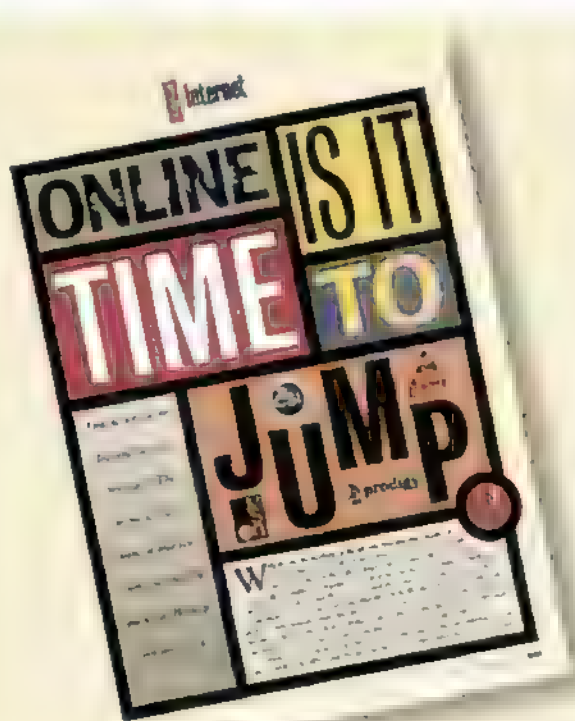
GREG LIBAN
Landgraaf, Netherlands

In your article, there was no mention of the user's location, which can have a serious effect on these services' accessibility. If you're near a major city or a heavily populated area, you can expect access problems. Most of these services have startup promotions that let you sign up for the first month either free or at a reduced rate. Try several different online services or ISPs, then choose the best.

JIM OBEREMPT
New Haven, Connecticut

Thank you for giving CSi the credit that it deserves. After hearing for months that the world would eventually switch over to AOL because it's aesthetically pleasing, I'm glad content finally won out. Might I add that I have never had any problems logging on to CompuServe.

GRANT D. SMITH
Laramie, Wyoming



Your best bet is to try several different online services or ISPs, then choose the best.

Your article on online services makes some excellent points, but it concludes that online services still matter because they provide convenient and focused content. That may be so, but I have found that many of the search engines now available have developed excellent features that permit me to mine information on the Web without feeling lost. I stopped using commercial online services in favor of a local ISP more than a year ago and don't feel at all deprived.

KIM G. GLENN
via the Internet

MORE QUIRKS AND QUESTIONS

I appreciated Bill Howard's column about PC annoyances ("Twenty Questions," May 6, 1997) and would like to add one of my own. I hate peripherals that come with the power transformer as a part of the plug or with it molded in line. The transformers-on-a-plug are a problem because of the space they take up on a power strip. Manufacturers should not assume that their peripherals are the only ones that users need or want. The in-line transformer is just clunky and always seems to be in the way.

DAVE HAMILL
Kwajalein, Marshall Islands

Add another quirk to Howard's column: Why is it that all my mobile peripherals have separate power supplies? They all work at 6V to 9.5V DC, and they all add weight that I have to lug all over the world. Can't someone make a power strip for mobile users?

C.R. WORKS
Warner Robins, Georgia

OF MICE AND KEYBOARDS

I found it interesting that you would give the Microsoft Natural Keyboard a thumbs-up ("Top 100 Hardware Accessories," May 6, 1997). I recently heard an orthopedic hand surgeon talk about the devastating effect that computer keyboards have on wrists, what with carpal tunnel syndrome and various other hand maladies. He lamented about the paradox of the Microsoft keyboard, noting that positioning the arms and wrists in an abducted position actually exacerbates the stress on the muscular and tendon structure of the hand. That the Natural Keyboard is considered "ergonomic" is an oxymoron.

DAVID M. LAMBERT
Towson, Maryland

Regarding your pick of the Microsoft Natural Keyboard as one of your "five essential upgrades," I think it's a fine keyboard except for the "6" key being on the wrong side of the split for touch typists. I was taught that the left forefinger keyed "4" and "5," while the right keyed "6" and "7."

JOHN BRADY
via the Internet

I was upset but not surprised that your "Top 100 Hardware Accessories" did not include any left-handed devices or even mention the availability of any left-handed versions of mice and trackballs. Microsoft's standard mouse and IntelliMouse, as well as the GyroPoint, the TrackMan Marble, and the two featured joysticks are virtually impossible for a left-hander to use. They definitely do not fit the adult left hand well because a button or trackball is situated on the left side, or, in Microsoft's case, it simply curves the "wrong" way. If there are no left-handed mice or trackballs, it is a sad thing that the computer industry alienates a good 15 percent of the population.

FRANCIS FERNANDEZ
via the Internet

A VS. Z

I read your article on removable storage ("Removable Storage: Unlimited Options," May 6, 1997) and have to disagree with your review of the a:drive from O.R. Technology. I feel that it is far superior to Iomega's Zip Drive. I used to have a SCSI Zip Drive in my old computer. It was slow, would cause my machine to lock up, and had numerous software-related problems. The only advantage of the Zip Drive is that it's portable. Just before I had my new machine built in January of this year, I read an article about drives based on LS-120 technology. It seemed like the perfect storage medium for my needs. I had one put into my machine and am glad I did. I have

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Letters

recovered files from normal 3.5-inch 1.44MB disks that were unreadable by the computers I use at work. I was then able to transfer these files to a fresh disk for use in other computers.

JOHN BORMAN
Virginia Beach, Virginia

MORE THAN JUST REVIEWS

As a technician responsible for setting the direction of hardware and software for our sales force, I can't remember when I saw a phrase like "market acceptance uncertain" used in one of your reviews ("Removable Storage: Unlimited Options," May 6, 1997). This type of insight reflects an understanding not only of the hardware and setup but also the state of the industry. I had been considering the Panasonic PD drive as a backup solution for the numerous notebooks I support, but, as the article noted, I saw that software developers like Cheyenne and Seagate did not recognize this device. I labeled this device as unacceptable—not because of the technology but because of lack of "industry acceptance."

KENT C. DRAPER
Milwaukee, Wisconsin

MONEY AND THE WEB

Jake Kirchner points out some valid concerns regarding the profitability of the Internet ("Warning: No Lifeguard on Duty," May 27, 1997). What it comes down to, however, is the ease and security of making purchases over the Web. Often, the consumer has to go through a lengthy registration process, after which he or she must yank out the credit card. The other (less frequently given) option is to order COD and pay extra for the privilege of using cash. Once debits can be made safely

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CORRECTIONS AND AMPLIFICATIONS

In our June 10, 1997, Trends/PCs article "The Arrival of Pentium II" (page 33), we incorrectly described the relationship between direct vendor Unicent Technologies and PC Importers. The two are separate companies; Unicent sells strictly Intel-based PCs, while PC Importers sells a variety of different types of systems. In the same article, we listed an incorrect direct-sales number for Intergraph; the correct number is 800-692-8069.

In our June 10, 1997, cover story, "Pentium: Part II," the ZD Business Winstone 97 score for the Polywell Poly K6233 MX (listed in the benchmark test chart on page 118) should have been 61.

In our June 10, 1997, First Looks article "Imposing Vision" (page 54), we incorrectly named Pixelworks as the manufacturer of the Plasmavision 42. The manufacturer is actually Fujitsu General of America (888-888-3424, 201-575-0380).

In our June 10, 1997, Trends/Internet article "Your First Web Page" (page 40), Namo Interactive's URL is given incorrectly. The correct address is www.namo.kr/eng_index.html.

In our May 27, 1997, Pipeline item "All-in-One Web Phone" (page 10), the price of the Nokia Communicator should have been \$1,200.

In our May 27, 1997, Trends/Internet article "Working the Net" (page 40), the phone number for E-Span should have been listed as 317-469-4535.

and easily using a regular checking or savings account in the same way one uses the ATM, the Web will begin making money.

GILBERT PILI
via the Internet

Sometimes, the real gems in your magazine are buried in places unsuspected. I grew up in a small-town retail business and share Kirchner's concern about service on the Web ("Web Commerce: It's a Personal Matter," May 6, 1997). Sadly, the type of service he is talking about rarely exists anymore.

BRUCE C. WARD
Wichita, Kansas

THROWING THE BOOK AT THE WEB

Michael Crichton's comments (Trends, "Can the Web Hurt Schools?," May 27, 1997) about the potential dangers of using the Web in schools are extremely apt. Encyclopedias are references that exhaustively research the information prior to publication, and technical journals have peer review procedures before going to print. But Web sites can be created and posted by anyone, without any validation of the information being necessary.

PHIL ESSLINGER
via the Internet

I think Crichton had the better of the argument with Reed Hundt over subsidizing schoolchildren's access to the Internet. The big problem with our schools is their failure to teach children to read, write, and cipher. The Internet won't help children learn those things. Access to the Internet and talk about computer skills is a red herring to divert the government's attention from the schools' failure to teach the basics.

JOSEPH P. MARTINO
via the Internet

ATTACK OF THE BROWSING DESKTOP

Michael J. Miller made a wonderful point in his column "Desktop Wars Revisited" (May 6, 1997). I've often wondered why Microsoft has decided to push the look of the desktop in the direction it has. Is it because the look and feel of a browser interface will be more user-friendly to new users whose main computing interest is to go online? Maybe, but I think Microsoft is trying to grind Netscape under its iron boot once again. Like Miller, I too don't think that a "browser" interface is the way to go. I don't want to install an update to Windows 95 that was conceived from a desire to make things difficult for Netscape. I use my computer for so many things other than surfing the Internet. Now either you can update your operating system with what Microsoft pushes on you or you can let your OS become outdated and use Netscape Constellation. Neither option is satisfactory to me. Netscape is no better than Microsoft in this area. I use Netscape most of the time. I am comfortable with it and don't mind paying for good software. But I want it to be only a browser; I don't want it to control my Microsoft OS.

RYAN M. MCGEE
via the Internet

ACROBATIC OS/2

Your First Looks review of Word Pro 96 for OS/2 Warp ("A True-Blue OS/2 Pro," May 27, 1997, page 58) lamented that there is no Adobe Acrobat viewer native to OS/2. Although one is still in beta code, you can download it from Adobe's Web site. On my machine at least, it has none of the bugs associated with beta products. An Acrobat authoring tool native to OS/2 may be available in the future.

AL DAVIS
via the Internet

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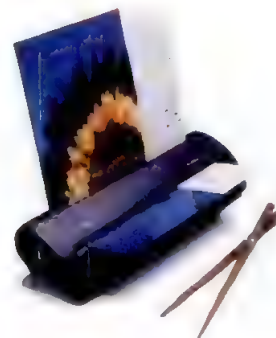
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visioneer

Trends

CEOs Go to Washington

The software industry's lobbying effort intensifies.

The captains of the computer industry gathered recently in Washington, D.C., to present a study showing how the software industry has transformed the U.S. economy, increasing productivity and creating high-skill, high-wage jobs. Yet their visit's real purpose was to meet with congressional leaders and cabinet officials in an attempt to shape the laws governing encryption and intellectual property, which will dramatically affect the evolution of the Internet as a medium for electronic commerce.

"Sound public policy helps e-commerce thrive, while policy decisions that burden the Internet will cause e-commerce to falter before it has a chance to reach its potential," the executives wrote in a letter to President Clinton. Although the good news from the study—commissioned by the Business Software Alliance (BSA)—was good indeed, some troubling trends tempered the findings. Because of U.S. laws that restrict the export of industrial-strength encryption software, there's a growing concern that U.S. software companies are at a competitive disadvantage in the global market. Internet-based software piracy is also a growing concern.

THE CAT'S OUT OF THE BAG

In other settings, many of the company chiefs who went to the Hill are fierce competitors. On these policy issues, however, a consensus exists among them. "We are completely united in the objection to the current encryption policies," said Lotus Development Corp. president Jeff Papows during the Washington visit.

"The cat's already out of the bag," said Eric Schmidt, Novell's new CEO, referring to the global availability of software with 128-bit encryption. "It's a race between the lock makers and the lock pickers. We need to have ownership, control, leadership of this in the U.S." To that end, the executives resoundingly support liberalizing the export laws governing encryption. "Getting reform done now is a priority for all of us," said Schmidt.

"Encryption is available globally and puts



U.S. business at a competitive disadvantage globally. The idea of escrowing keys has not even been demonstrated as feasible," said Symantec Corp. CEO Gordon Eubanks, referring to the policy that calls for a government agency to hold keys to encrypted information in the interests of protecting national security. "We're losing core com-

Economic Ripples

The software industry is a powerful engine for U.S. economic growth, according to a recent Business Software Alliance (BSA) report quantifying both its direct impact and its ripple effect on other industries.

- ▶ Last year, the software industry employed 619,400 people; employment is expected to grow 5.8 percent per year from 1996 to 2005, for a total of 1,030,500 jobs.
- ▶ Software industry jobs are among the most highly paid and skilled, with wages averaging nearly \$60,000 per year.
- ▶ Software ranks as the third-largest U.S. industry, behind cars and electronics.

petency in the U.S.," said Novell's Schmidt. "Current proposals just won't work because of scope and scale. Billions of keys would need to be managed."

Perhaps Adobe Systems CEO John Warnock summed up the imbroglio best. "The ability to encrypt messages exists throughout world. To try to take all of that and bottle it up with a technological solution is impossible. We can't build a technical solution that will solve this problem," he said.

THE HOME SHOPLIFTING NETWORK

Solving the problem of software piracy is another issue the execs brought to the Hill. "The software industry continues to get stolen blind. If \$13 billion in products were stolen in any other business, people would be furious," said Autodesk CEO Carol Bartz. The statistics are astounding indeed. According to the BSA report, the software industry lost an estimated \$6.5 billion in 1996 because of piracy.

The Internet—or, as Autodesk's Bartz calls it, "the world's biggest software home shoplifting network"—is aggravating the problem. "We need support from the administration to extend copyright laws to the Internet," she said.

The CEOs are united in hoping that legislative changes are imminent. As Intel Corp. CEO Andy Grove said, "We're operating under different natural laws. The computer industry operates on Internet time, which is three times as fast as clock time. The government works three times slower than clock time. That's a ninefold difference." He added, "Patience is not one of our virtues."—Carol Levin

- ▶ The growth rate from 1990 through 1996 was 12.5 percent, almost 2.5 times as much as the overall economy's.

The ripple effect accounted for an additional 1,445,600 jobs and \$47.4 billion in wages in 1996. Both directly and indirectly, the U.S. software industry provided 2,065,000 people with jobs in 1996, with a total of \$83.7 billion in wages. Employees who use computers earn 10 to 15 percent more than those in equivalent jobs who do not. "By the year 2005, the U.S. software industry will generate more than 3.4 million jobs and \$139 billion in wages," says BSA president Robert Holleyman.

Netscape Spills The JavaBeans

Web applications are arriving.

The Internet's impact on application development is just beginning," said Netscape Chief Technology Officer Marc Andreessen in opening the company's recent developers' conference. Andreessen announced Netscape's commitment to the JavaBeans component model, and he focused on how enterprises can deploy "crossware" applications—Web-based programs for heterogeneous computing environments.

Andreessen's new white paper "Crossware Applications for Networked Enterprises" is posted at Netscape's Web page DevEdge Online. It details how companies can use the JavaBeans component model to deploy crossware apps. Netscape will extend all its products toward JavaBeans by 1998.

On stage, Andreessen demonstrated a crossware application scripted with JavaScript and based on JavaBeans. In the demo, an airline ticket holder phoned Royal Airways, and an airline employee pulled up a Web application displaying the plane's seating map and accessed a database of information on meals from a catering company. "As JavaBeans components proliferate," said Andreessen, "enterprises will join in-house applications with applications outside the firewall."

Netscape's ONE (Open Network Environment) strategy is the core of its plan for hooking distributed object technology and applications to desktops on all platforms. ONE is based on the Internet Inter-ORB Protocol



(IIOP) and the Common Object Request Broker Architecture (CORBA). Sun positions its Java and JavaBeans as standards that work with ONE/CORBA.

Microsoft's strategy for bringing distributed components together into applications is based on ActiveX, resulting in a face-off with Netscape over component standards. That battle is far-reaching, because really at stake is whether Microsoft's or Netscape's architecture will work best.—Sebastian Rupley



Separated at Birth?

YOU CAN'T JUDGE A NOTEBOOK BY ITS cover—or its clock speed. In testing 60 notebooks for this issue's cover story ("Portable Desktops"), we were struck by a pair of conspicuous trends: For more than half the machines, there was a strong external resemblance to at least one other machine in the roundup, and 14 offered 200-MHz clock speeds. Yet these trends, as our test results revealed, were not what they seemed.

Look-alike notebooks are to be expected.

Many PC vendors purchase their notebooks from outside sources rather than manufacturing them, and not surprisingly, several companies might buy hardware from the same manufacturer and sell the same design. These systems typically carry the same Federal Communications Commission (FCC) number, a code assigned when a notebook passes emissions testing. With few exceptions, the numbers are prominently printed on the undersides of today's notebooks.

Machines with matching FCC numbers, however, don't always exhibit the same performance.

Increasingly, vendors that purchase notebooks from third parties are altering the machines. The DFI 8120 and Jetta International's JetBook 7000+ are examples of similar systems that carry the same FCC number; they use the same processor, motherboard, display, and graphics chip set, and they employ similar hard disks. Yet the DFI 8120 has a different graphics driver and had higher Graphics WinMark and Winstone scores, and the JetBook 7000+ produced slightly better CPUmark scores with its own chip set and BIOS. Some clones, such as All Computer's ACT NA5130PX and Broadax Systems' XGA-1330, are identical in appearance, makeup, and ability.

In the other trend we noticed in our testing for the cover story, 14 machines—including the DFI and Jetta systems—contained 200-MHz MMX Pentium processors. In January, Intel introduced four MMX Pentium chips, two for desktops and two for portables. The 200-MHz notebooks we reviewed use desk-

top chips: Although Intel introduced a 133-MHz mobile version and a 233-MHz desktop version this summer, it has yet to ship a mobile chip that runs faster than 166 MHz. (The company's mobile processor Tillamook, a 1.8-volt design with speeds of 200 and 233 MHz, arrives later this year.)

But although 200-MHz notebooks offer the highest clock speed on the market, they don't necessarily provide the best performance. Whereas the 150- and 166-MHz mo-



tile versions run at 2.45 volts, the 166- and 200-MHz desktop chips run at 2.9 volts, thus requiring more battery power and running much hotter. Generally, machines using these chips have low battery lives and use blustering CPU fans. During BatteryMark testing, the average 166-MHz notebook lasted an hour and 25 minutes longer than the average 200-MHz notebook.

Adding insult to injury, the average 200-MHz notebook scored a full point below the average 166-MHz system on our Winstone benchmark tests. The Winstone score is essentially a product of the chip set; the best performers usually had Intel mobile chip sets (either the 430MX or the 430TX), whereas the 200-MHz system typically used a third-party desktop chip set. The two 200-MHz systems to use Intel chip sets—ARM Computer's ARMNote TS97MX and The Brick Computer Co.'s Ergo CD-PowerBrick³—were among the top ten performers.—Cade Metz

Larger Wafers, Cheaper Chips

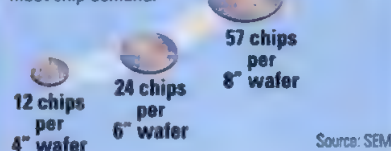
Manufacturers retool for future chips.

An advance in chip manufacturing has an enormous effect on chip production. The transition to smaller "line widths"—the dimensions of a chip's elements—has permitted smaller chips that have more transistors and run at a higher clock rate. Manufacturers are planning to upgrade their equipment to produce larger wafers. (A wafer is the circular slice of silicon from which chips are produced.)

To make the processor of the year 2011, predicts Intel CEO Andy Grove, chip makers will shrink line widths from today's 0.35-micron width to an even more microscopic 0.07-micron width. (Intel's 200-MHz and 233-MHz Mobile Pentium MMX processors, available this fall, will use a 0.25-micron process.)

Pumping Up Factory Output

Chip manufacturers plan to increase wafer diameter from 8 inches to 12 inches and shrink the manufacturing process from 0.35 microns to 0.18 microns. As a result they'll be able to pack more chips per wafer, lower costs by 25 to 40 percent, and use fewer factories to meet chip demand.



Another advance is the transition to larger wafers, which will enable the production of more chips from a wafer. Manufacturers of memory chips and logic chips expect the larger wafers to increase productivity by 2 to 2.5 per-

cent, according to Stanley T. Myers, president of Semiconductor Equipment and Materials International (SEMI), an international association representing 1,850 makers of materials and equipment used in developing semiconductors and flat-panel displays. "Consumers get more memory for less money," he adds.

To be sure, the move is no small undertaking. Market research firm Dataquest estimates that the industry-wide cost of converting equipment so it can produce 300-mm wafers will reach \$30 billion.

By the first half of 1998, chip makers should be able to buy a complete set of tools for building 300-mm wafers, according to George Lee, director of SEMI's 300-mm initiative. Already, several companies—including Intel, Motorola, NEC, and Texas Instruments—have announced plans to install 300-mm equipment. Factories are ramping up for testing the new process and expect volume manufacturing to begin after the turn of the century.—*Carol Levin and Angela Hickman*

JAKE KIRCHNER

We All Want to Change the World

In the center of Beijing's Tiananmen Square—the birthplace of modern China—if you stand at the monument to the fallen heroes of the Communist revolution and face the memorial to Mao Zedong, rising above it in the distance you will see a lighted Golden Arches sign.

In this city of 9 million people and 8 million bicycles, you're never far from a McDonald's, Kentucky Fried Chicken, or Pizza Hut. It's no surprise, then, that the first billboard you see on the new superhighway connecting the international airport with the center of Beijing is a sign advertising IBM. Solutions for a small planet, indeed.

Although China doesn't yet rival the U.S. as a market for computers (or fast food, for that matter), it's catching up fast. Last year 3.5 million PCs were sold there. That's a small number compared with the 1996 U.S. market—at 27 million desktops and laptop machines, the world's largest—but Chinese purchases may exceed 10 million a year by the end of the century. That would place China at number three, trailing only the U.S. and Japan.

As the world's leading industrial conglomerates scramble to position themselves in this burgeoning market, equally impressive is China's growing stature as a supplier to the world's PC markets. Many China watchers are convinced this country will assume the industry leadership, which, until recently, Japan thought was its game to win or lose. Certainly, if you see the country as including both the mainland (recently reunited with the financial superpower Hong Kong) and the industrially precocious Taiwan, you can make a good argument that China is the computer industry center deserving the most respect, if not fear.

But even in mainland China alone, the PC industry is an everyday fact of life. In Suzhou, a 2,500-year-old city famous for silks, rice, and



classical Chinese gardens, 200,000 people work in a new industrial district constructed in the last five or six years. Modern high rises house the employees of the sprawling factories of Western corporations and the new restaurants and four-star hotels along the parks, canals, and broad, tree-lined roads of this ancient and instant city.

In the Acer Group's Suzhou peripherals factory, hundreds of young Chinese in white lab coats assemble keyboards and monitors for overseas markets. Their \$300-a-month pay doesn't make them the cheapest labor

force, but they're certainly part of a large, well-educated, and highly motivated work force in a country modern enough to attract foreign investment while inexpensive enough to keep investors from fleeing.

If one gets a single overriding impression from touring China today, it's of the country's limitless economic possibilities. Today, in exchange for our fried chicken and hamburgers, China is shipping us computer components and peripherals. Although some in the U.S. dismiss China as a fabricator of components designed in Japan to run American software in the U.S. and Europe, the Chinese are not nearly so retiring.

For instance, the Acer Group, which is headquartered in Taiwan but is rapidly expanding its mainland facilities, is planning to invest a billion dollars in new ventures. It hopes these projects eventually will include at least 100 companies devoted to software development.

The Chinese do not lack ambition. And in a country where anything from the Ming Dynasty (which ended about 350 years ago) is considered "new," people take the long view. Acer Group chairman and CEO Stan Shih told visiting Europeans and Americans recently, "I guarantee that 100 years or 200 years from now, some Acer company will operate in your country." He's probably right, and those companies probably won't be selling us pizza.

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Computer Retail Week, May 26, 1997

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PC Week, April 28, 1997

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Windows Magazine, June 1997

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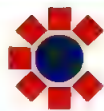
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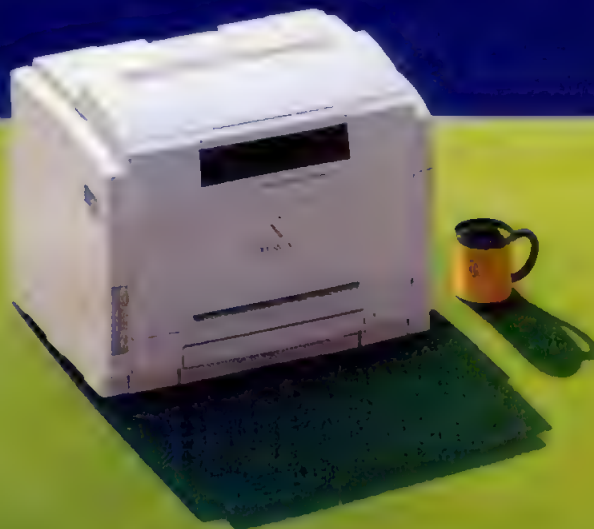
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'desktop color laser' is not a fib."*

Lyra Research - The Hard Copy Observer



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Now you can afford the quality and speed of color laser technology along with breakthrough convenience features that save time and effort.

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NOTEBOOKS

The Latest Portables

In this issue's annual notebook blockbuster, "Portable Desktops," we evaluate 60 notebooks from 41 vendors. Here are details on key machines released after our deadline from Hitachi PC Corp., Nimantics, Sharp Electronics, and Sony Information Technologies of America.

Fresh from its entry into the desktop market last fall, Sony (800-476-6972, www.sony.com/pc) ventures into the notebook arena with a pair of impressive systems. Both the **PCG-705** (starting at \$3,500) and the **PCG-707** (starting at \$4,500) have a system weight of 5.2 pounds and are outfitted with a 12.1-inch display (SVGA on the PCG-705 and XGA on the PCG-707). The PCG-705 is equipped with a 150-MHz MMX Pentium and 16MB of RAM, while the PCG-707 uses a 166-MHz MMX Pentium and 32MB of system memory (each unit supports up to 128MB of memory). Other components include a 33.6-Kbps internal modem, a USB port, NTSC video out, a 2.1GB removable hard disk, and 256K of secondary cache.

Although both systems are only 1.5-inches thick, they include a pair of drive bays that support a battery, a 14X CD-ROM drive, or a 3.5-inch floppy disk drive. The floppy disk drive can be used externally and the CD-ROM drive can even play audio CDs while the machine is in sleep mode. Both units ship with a set of headphones that provides remote CD controls.

Hitachi (800-555-6820, www.hitachipc.com) has added a sub-notebook, the **VisionBook Elite**, to its line of portables. The Elite (\$5,300 street) offers a 2.1GB hard disk, 16MB of EDO RAM,

a 13.3-inch display with 1,024-by-768 resolution, and a Chips & Technologies graphics chip set with 2MB of VRAM. An internal daughtercard integrates a 166-MHz MMX Pentium and 256K of secondary cache.

The Elite's case, which is made of carbon fiber, is just 1.4-inches thick and has a travel weight of 5.9 pounds. The unit includes a USB port, an infrared port, and a cellular-ready integrated 56-Kbps modem. A slim media file bay (which attaches to the underside of the system) offers a MIDI port as well as a bay for a modular 10X CD-ROM drive and a modular floppy disk drive that can also be used externally. The machine ships with a half-pound lithium ion battery (upgradable to a longer-lasting 1.2-pound battery).

Sharp (800-237-4277, www.sharp-usa.com) is supplement-

ing its mobile offerings with the **PC-9320T** and the **PC-9800T**. Priced between \$3,000 and \$3,500, the PC-9320T is outfitted with a 150-MHz MMX Pentium, a 1.6GB hard disk, 16MB of RAM, an 11.3-inch active-matrix display with 800-by-600 resolution, a Trident graphics chip set with 2MB of EDO RAM, and 256K of secondary cache. An integrated 10X CD-ROM and floppy disk drive are included. Sharp also includes a USB port, a 33.6-Kbps modem, a Fast IR port, Zoomed Video, and CardBus support.

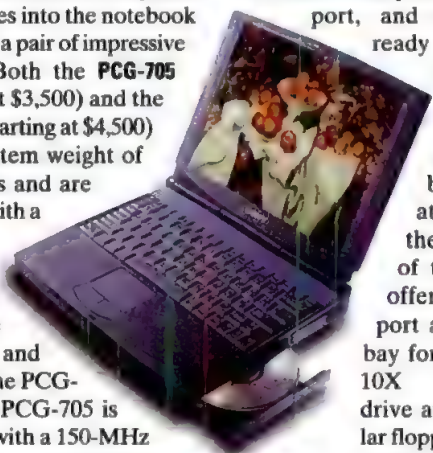
The PC-9800T, the company's new high-end portable, costs between \$4,000 and \$4,500. This 166-MHz MMX system includes a 2.1GB hard disk, 32MB of EDO RAM, a 12.1-inch TFT display with 1,024-by-768 resolution, 512K of secondary cache, and a Trident graphics chip set with 4MB of EDO RAM. Like the PC-9320T, the PC-9800T offers a 33.6-Kbps modem, Fast IR, Zoomed Video, CardBus, and

USB. The 10X CD-ROM drive sits in one of the system's two multibay ports. These ports can also accommodate a standard floppy disk drive, a battery, or an AC adapter.

One of the first vendors to ship a notebook equipped with the desktop version of the 200-MHz Pentium was Nimantics (800-646-5005, www.nimantics.com). Now it's using the true mobile version of the 166-MHz MMX Pentium.

This 2.45V chip is the centerpiece of the company's \$3,699 **Orion 10-MX**, which houses a 10X CD-ROM, a floppy disk drive, and a lithium ion battery.

The primary feature set rivals that of most high-end notebooks: a 12.1-inch SVGA display, 48MB of EDO RAM (64MB maximum), 64-bit graphics with 2MB of EDO VRAM, and a 2.1GB removable hard disk. Input/output devices include an internal 33.6-Kbps modem with full duplex speakerphone support, a FastIR port, and NTSC/Pal Video TV out.—Cade Metz



NEW ENTRY:
Sony's PCG-705.



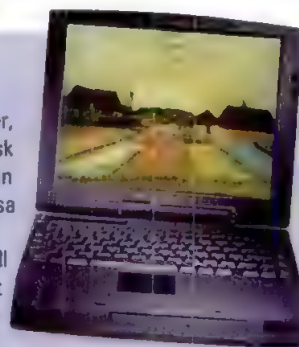
KEEPING SHARP:
Sharp's 9800T

Maximum Capacity

The 120MB LS-120 floppy disk drive is going portable. By the end of the summer, NEC will equip several machines in its Versa notebook line with the SuperDisk LS-120 drive—a device capable of storing almost 85 percent more data than standard 1.44MB floppy disk drives. By the end of the year, all modular Versa products will ship standard with the technology.

The SuperDisk reads and writes to both standard 1.44MB floppy disks as well as high-density 120MB disks. The drives have not reached the desktop market en masse, but NEC's introduction of the technology in notebooks may help fuel its adoption in PCs. NEC will incorporate the SuperDisk in upcoming revisions of the **Versa 6000** and the **Versa 6200**, and it will ship a modular version for the VersaBay II (available on several existing NEC notebooks). The device will function under Microsoft Windows 3.11, Windows 95, and Windows NT in the Versa 4000, 4200, 6000, 6010, and 6030. It will also be bootable in the 6050 and the 6200, but older BIOS versions in other models may not provide boot support. Furthermore, the VersaBay II SuperDisk drives will work with NEC's Docking Station 4000, 6000, and 6000Plus as well as the Mini Dock 6000. The company will sell the drive with an upgrade kit that includes the appropriate drivers and BIOS updates for Microsoft's trio of major operating systems.

By the end of the year, other notebook vendors, including Twinhead, will introduce LS-120 drives. —CM

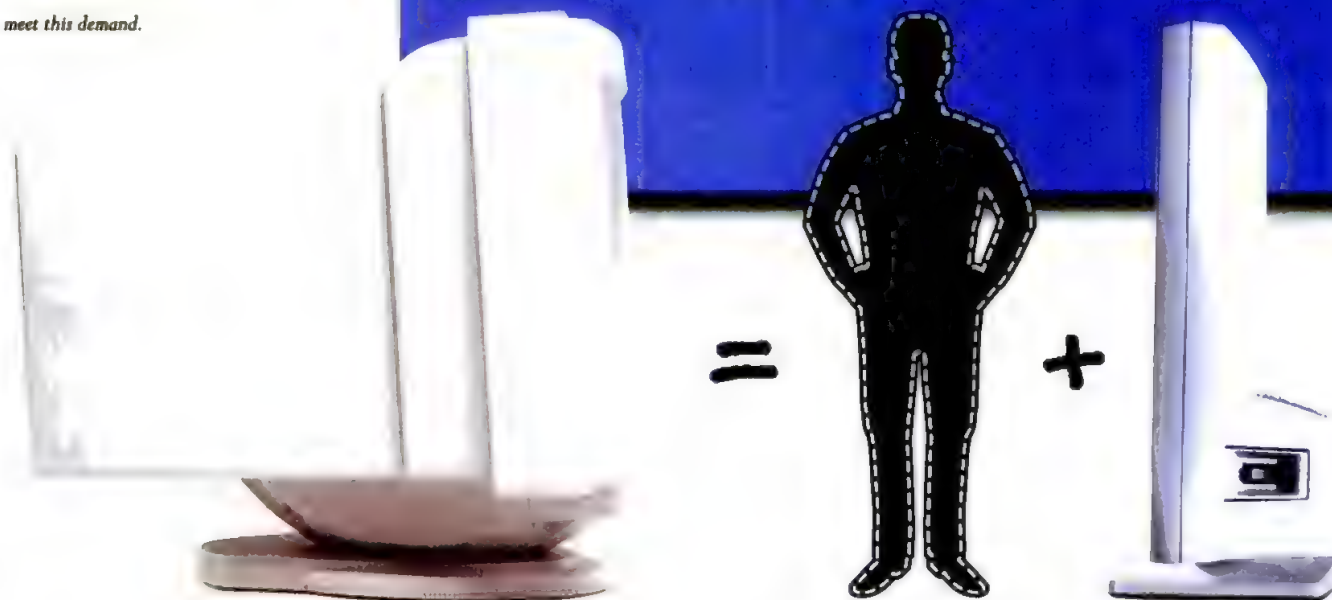




**REPLACING A
BIG, BULKY CRT**

*with a slim flat panel display
actually makes room for more
traders on the floor. Which is
a good thing, since the trading
volume on the major exchanges
is higher than it has ever been in
the past. The increased volume
in trades means that there is an
even greater need for traders to
meet this demand.*

**Perhaps the first
instance where
computers are
being replaced
by people.**





1 IN A FREE MARKET ECONOMY, companies are always competing for capital. In fact, the market has never been more competitive than it is today.

This increases the number of specialists needed to trade stocks. It also puts an additional burden on the technology needed to support this effort, since traders need to constantly view as many as four or five displays to stay abreast of market news and economic data.



On Wall Street at least, it appears that less may actually be more. Because replacing big, bulky, energy-hogging CRTs with slim flat panel displays allows you to put more traders on the floor of the exchange.

Take NEC Technologies' new MultiSync™ LCD monitors, including the world's first commercially available 20.1" viewable LCD monitor. These remarkable flat panel displays take up 60% less space and weigh 70% less than a traditional monitor. Size, however, is not all that sets them apart.

Our XtraView™ technology enables clear and accurate viewing of the screen at

NEC MultiSync LCD2000
20.1" Viewable LCD Monitor

virtually any angle (which comes in handy when you're trying to see over the shoulder of another trader). These monitors produce a brighter, sharper image than many CRTs. They eliminate eye-fatiguing flicker (which traders will appreciate since they have to keep an eye on so many displays). They also consume up to 50% less power and have much lower emissions. Plus they're compatible with most PCs, Macs and workstations.

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Or, if you prefer, please visit us at www.nec.com. Expect more. Experience more.



2 THE TRADING FLOOR is crowded

with specialists. The trading floor is also crowded with big, bulky CRTs that take up precious room. These CRTs also hog energy and produce a tremendous amount of heat. (Besides, as any trader will tell you, it's already "hot" enough on the trading floor.)

MultiSync™ LCD Monitor Series

	LCD2000™	LCD400™
Viewable Size	20.1"	14.1"
Maximum Resolution	1280 x 1024	1024 x 768
Weight	22.0 lbs	11.5 lbs
Dimensions (W, H, D)	19.7 x 19 x 8.7"	14.1 x 14.3 x 6.7"
Brightness	150 cd/m²	180 cd/m²
Viewing Angle	160° conical XtraView technology	160° conical XtraView technology

Both models are compatible with PC, Mac, workstation or any VESA compliant analog RGB signal, no special card required



4 MORE TRADERS MEANS MORE TRADES, which means more money. (And let's be completely frank, shall we, what financial person doesn't like news like that?) In fact, one could even argue that migrating from big, bulky CRTs to slim flat panel monitors like the MultiSync LCD2000 could actually put a positive spin on the term 'downsizing'.

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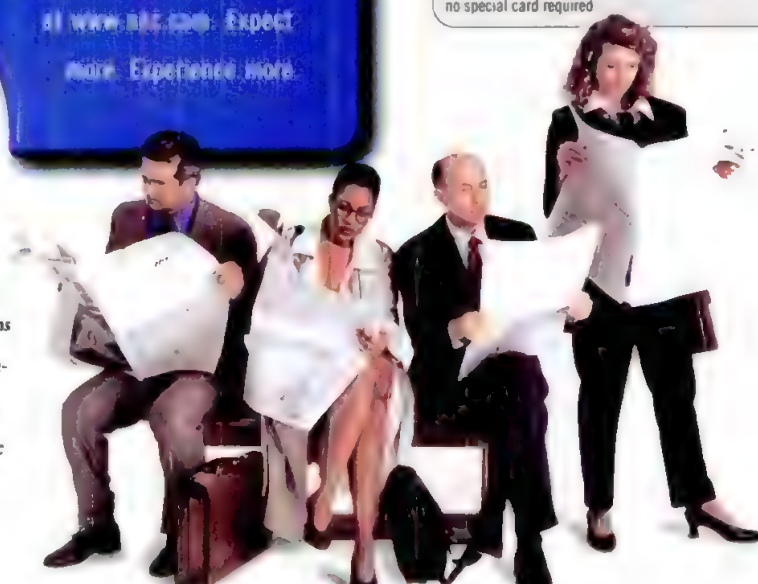


IMAGE EDITING

A New Focus on Imaging

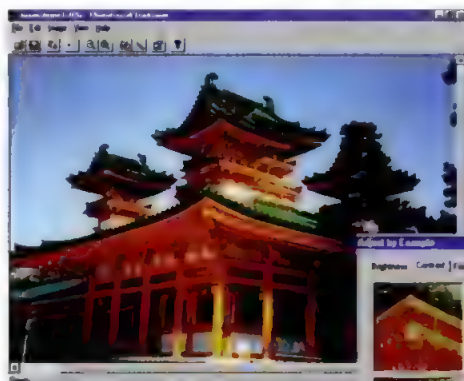
With the proliferation of digital cameras, scanners, and the distribution of photos over the Internet, there's never been a greater demand for digital imaging tools.

If you're looking for a full-featured, easy-to-use image editor, Ulead Systems has released an update to its \$100 **Ulead PhotoImpact with WebExtensions** (800-858-5323, www.ulead.com). The package is now optimized for use with Intel's MMX Technology, which means you'll see improved performance while painting, editing, and viewing images. This version also adds support for Microsoft Windows NT 4.0 and the FlashPix file format. The Web utilities have been enhanced as well, reflecting the recent upgrades to GIF Animator 1.5, a tool for crafting a wide range of GIF animations, and GIF/JPEG SmartSaver 1.2, which adds better color reduction for GIF images as well as integration with Microsoft FrontPage 97. The update is available as a free download via Ulead's site.

Polaroid Corp. (800-533-9680, www.polaroid.com) now makes improving your photos so easy even grandma can handle it. The \$29.95 **Before & After** puts you just a single click away from improving your images. This utility is based on Polaroid's patented Image Quality Assured technology, which analyzes the data in an image and automatically improves sharpness, brightness, contrast, and color balance. Although not all images will end up looking better, **Before & After** is particularly good at improving blurry, jaggy scanned images as well as images downloaded from the Web. Unfortunately, the package is optimized for use with only a limited number of digital cameras, scanners, and printers (even though others will work as well).

Graphic designers and ambitious amateurs will appreciate

Auto F/X's series of special effects plug-ins (603-569-8800, www.autofx.com). They are compatible with such popular packages as Adobe's Illustrator,



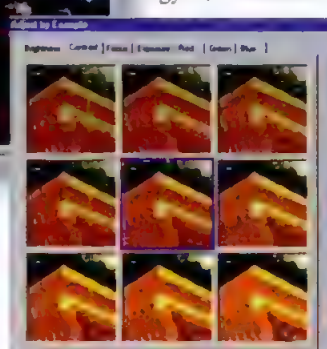
VISUAL AID: PhotoRecall lets you choose which image looks best.

Photoshop, PageMaker, and PhotoDeluxe; JASC's Paintshop Pro; Fractal Design's Fractal Painter; Corel PhotoPaint and Corel Draw; and more. New to the line is **Ultimate Texture Collection: Art & Organics**, the third volume in a series of plug-ins containing over 1,000 seamless and full-size textures. This volume offers everything from French Impressionist works to natural surfaces like tree barks, grass, and water. Also new is **Photo/Graphic Patterns**, which contains 1,000 dramatic textures, and **Photo/Graphic Frames Volume 1: Off the Wall**, which features over 120 picture frames for use in layouts. Both are priced at \$129.

Need a way to store your images? G&A Imaging's **PhotoRecall** (\$50 street) offers three components for storing, enhancing, and viewing your images (888-772-7601, www.ga-imaging.com). The Portfolio and Library utilities manage your photos in a subject-categorized

album database of thumbnail images. You can embellish and improve your images with the integrated image editor; you can also add special effects and map images to a cylinder or sphere. Once you're finished adjusting your photos, you can store them in a digital album and create slide shows that can be viewed over the Internet without plug-ins. Images can be acquired from any Twain-compliant source.

Vision Technology's \$79 **Archivist**



(415-299-9101, www.visiontechno.com) offers an automated solution for storing your image files in a manageable fashion. The software uses a file-drawer metaphor that helps you locate, capture, view, and organize audio clips as well as video and still images. The database features a search engine, so you can ferret out your data by keyword, date, file type, and other criteria. Drawers can be viewed as thumbnail contact sheets, and you can even gener-

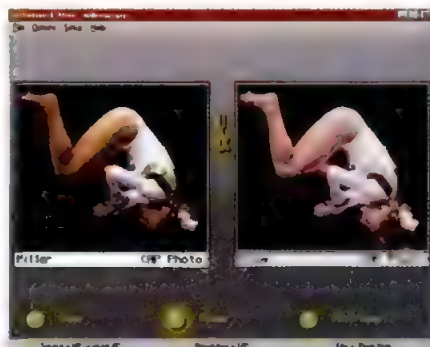
ate multimedia presentations that use Archivist's Media Show Player. The video-capture feature supports up to 50 frames, and you have basic image manipulation as well.

Hi-Image's \$89 **Picturama Artist 1.5** takes a similar approach to image storage (415-358-8500, www.hi-image.com). The Twain-compliant package offers tools for creating multimedia slide presentations, editing images, and searching through the image database (which is organized into subject-specific albums). The software also lets you interface directly with your browser, so you can download images into Picturama and upload images from Picturama to the Web.

Families will appreciate NewSoft's **Presto! PhotoAlbum**, a \$30 package (street) that allows you to store and share your scanned or digital images (800-436-4365, www.newsoftinc.com).

Building on the album metaphor, the interface is simple to work with and lets you put together multiple, customized photo albums. A clip-art gallery makes it easy to add graphics, frames, and more to your photos; there's even a built-in image editor. Photos can be annotated with voice messages and captions, and images can be acquired from any Twain-compliant device. You can store an album (complete with album viewer) on a floppy disk to share your photos with family and friends.

Creative Wonders' forthcoming **Picture Creations All-in-One Studio** (\$50 street) lives up to its name by packaging an image editor and album creator with thousands of templates, graphics, and clip art. It includes tools for making greeting cards, calendars, and more (800-549-9778, www.creativewonders.com). You can easily include voice recordings and video clips and share projects via e-mail, slideshow presentations, or screen savers.—Melissa J. Perenson



POINT-AND-CLICK: Polaroid's Before & After can really help you improve your images.

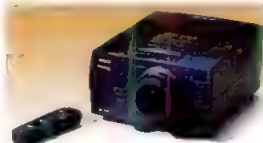
Trends Peripherals

LCD PROJECTORS

Leave the Lights On

If you're a hard-core road warrior, here's a better way to make your pitch: Instead of crowding everyone around a notebook screen or relying on your host's monitor, put your PowerPoint presentation up on the big screen with a portable LCD projector. The current models cost between \$6,000 and \$10,000, and each one weighs 10 to 30 pounds. In addition, they all project images bright enough to view under normal lighting conditions.

We tested 13 portable projectors in our roundup "Lighter & Brighter," featured in this issue. Units from ViewSonic Corp. (800-888-8583, www.viewsonic.com), Dukane Corp. (800-676-2485, www.dukane.com), and Epson America (800-463-7766, www.epson.com) either weighed more than our 16-pound cutoff or weren't finished in



FOR THE BIG SCREEN: New portable projectors from (clockwise) Epson, ViewSonic, and Dukane.

time for testing. ViewSonic's debut model, the **PJ800 LCD Projector** (\$6,000 street price), is a 21.6-pound, three-



panel polysilicon unit with a native resolution of 800-by-600 (scalable to 1,024-by-768). Maximum brightness and uniformity are achieved through ViewSonic's Advanced Optical Prism Uniformity System (OPUS). The projector uses a 260-watt metal halide lamp with a 3,000-hour life span, and it features a built-in handle and a wireless remote control with a built-in mouse. It includes a three-year limited warranty as well as a 48-hour exchange service.

The 14-pound **ImagePro 8020** (\$9,000 street price), from Dukane, features 800-by-600 native resolution that can be scaled up to 1,024-by-768

or down to 640-by-480. It uses a 150-watt metal halide lamp that's good for 2,000 hours of use. Along with a one-year limited warranty, Dukane provides a free loaner if your projector needs repairs.

Epson currently offers the lightest, brightest three-panel polysilicon true XGA (1,024-by-768) projector available: its **PowerLite 7000** (\$12,999 list price). Targeted at the CAD/CAM market and users who require higher native resolution, the unit weighs 14.5 pounds and uses a 150-watt metal halide lamp that's rated for 2,000 hours. A one-year limited warranty includes Epson Private Line and Road Service.—*Toni F. Kistner*



PORTABLE ACCESSORIES

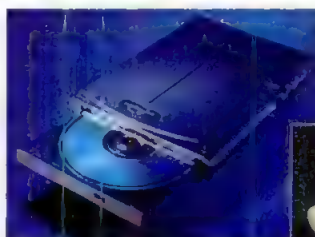
Notebook Makeovers

With the price of a high-end notebook computer rivaling that of a good used car, it's no wonder portable devices are big business.

Users who want the versatility of parallel-port-connected peripherals will appreciate the **backpack bantam** (\$299 without sound, \$349 with sound), an 8X CD-ROM drive from Micro Solutions (800-890-7227, www.micro-solutions.com). The 1.5-pound, calculator-size drive has a data-transfer rate of 1,200 KBps, and it includes line input and output jacks along with headphone output and microphone input jacks. If you prefer a PC Card connection, Synchrome Technology (800-767-0085, www.synchrome.com) offers the **Maestro PC-8** (\$300 street). This 8X CD-ROM drive has a data-transfer rate of 1,200 KBps, which it maintains using power from either your notebook, six AA batteries, or an AC adapter.

Instead of upgrading your

notebook's hard disk, consider supplementing the existing one with an external disk from EXP Computer (800-397-6922,



PORTABLE POWER: Units from (clockwise) Micro Solutions, E-mu Systems, and MindPath.



www.expnet.com). The 12-ounce **HD Traveler** comes in 1.4GB and 2.1GB capacities (\$430 and \$500 street, respectively), fits into a shirt pocket, and connects to your notebook via a PC Card. The included portable game-port adapter lets you attach a joystick or gamepad to your notebook.

High-quality sound for your notebook presentations is only

a PC Card away with the **EMU8710 Audio PC Card** (\$400 street), from E-mu Systems (408-438-1921, www.emu.com). A longtime manufacturer of professional digital audio equipment, E-mu Systems is targeting this card not only at the mobile professional, but also at audio producers, editors, and musicians who need to capture, edit, and produce audio files outside the studio.

The card's SoundFont technology allows it to play MIDI files with the same clarity as .WAV files (while taking up less than one-tenth the storage space).

If you want a savvy way to deliver your presentations, try the **PocketPoint** (\$100 street), from MindPath (800-634-7424, www.mindpath.com), a credit-card-size wireless remote control combined with a laser pointer. Working with MindPath's Presentation F/X software, the remote lets you present a slide show and trigger special effects such as ticker-tape messages, sound effects, and title screens.—*TFK*



CAMERAS

One-Minute Photos

Consider this the ultimate add-on for the mobile professional who needs to capture digital images on the run. Nikon's next-generation camera, the **Coolpix 300** (\$700 street), lets you upload pictures via your notebook's PC Card slot without cables or software (800-526-4566, www.nikonusa.com).

This 5-ounce device holds up to 132 JPEG images at 640-by-480 resolution in compressed format. It has an integrated LCD screen that controls most of the camera's settings and lets you view and manipulate images—and even create slide shows—on the spot. Annotate images with the built-in microphone, which can capture up to 17 minutes of audio, or use the stylus to superimpose handwritten notes over an image. You can capture digital video at 30 frames per second, too. A macro feature lets you take close-ups of small items from as close as 5.5 inches. The Coolpix 300 uses four AA batteries.—*Melissa J. Perenson*

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FRIGHTENINGLY FAST VIDEO.**



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166MHz PENTIUM® PROCESSOR
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- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- Motorola 33.6 Fax Modem
- Nylon Carrying Case
- MS Office 97 Small Business Edition
- Microsoft Windows 95
- IrDA 1.0 Standard Compliant
- Touchpad/Under 7 Pounds
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- NEW 1.6GB Hard Drive
- Options Bay accepts 12X Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
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- MS Office 97 Small Business Edition
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Business Lease: \$122/Mo.
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NOW WITH MMX TECHNOLOGY.

According to the trendspotters, things are really speeding up in the notebook business. And if you want proof, just take a look at the new Dell Latitude LM M166ST. Its heart beats at an astounding 166MHz, thanks to its new Mobile Pentium® processor with MMX™ technology. MMX technology, by the way, is another way of saying gut-wrenching multimedia. The Latitude LM M166ST also has a 12X Variable CD-ROM drive – again, among the fastest you can get in a portable. Then there's the new NeoMagic 2093 enhanced 128-bit Graphics Accelerator for faster and better color resolution and 64,000 colors. Our service and support is pretty darned speedy, too. Not that you're likely to need it.

We'd love to build some Latitude LM systems for you. One or a thousand. Quickly, of course. All you have to do is call. But do it fast. You don't want to lag behind the trend, do you?

NEW DELL LATITUDE LM M166ST

166MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

- 12.1" SVGA Active Matrix Display
- 16MB RAM (72MB Max.)
- 256KB L2 Pipeline Burst Cache
- NEW 1.6GB Hard Drive
- Options Bay accepts 12X Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Li-Ion Battery
- PCI Bus with 128-bit Graphics Accelerator with 64K Colors
- Integrated 16-bit Stereo Sound
- Smart Lithium Ion Battery
- MS Office 97 Small Business Edition
- Microsoft Windows 95
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- 16MB RAM (72MB Max.)
- 256KB L2 Pipeline Burst Cache
- NEW 1.6GB Hard Drive
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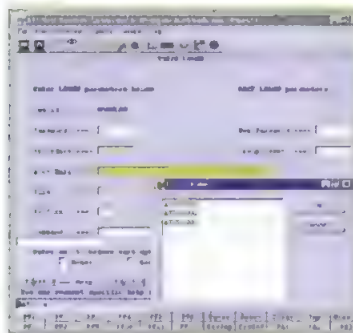
JAVA HOST TERMINALS

Mainframes Alive!

Hoping to ease the cross-platform woes of networks everywhere, three companies have released Java versions of mainframe terminal-emulation programs. In theory, users will have access to a variety of host applications, regardless of their client hardware or operating

systems. No special software needs to be installed; all communications run over standard Java sockets.

As with the other two products mentioned here, OpenConnect Systems' **OC/WebConnect Pro** (\$595 plus \$99 per user; 972-484-5200, www.oc.com) supports the simple emulation of a traditional terminal's green screen. Using the included OpenVista utility, you can also program more customized PC-like screens via a drag-and-drop



Windows environment.

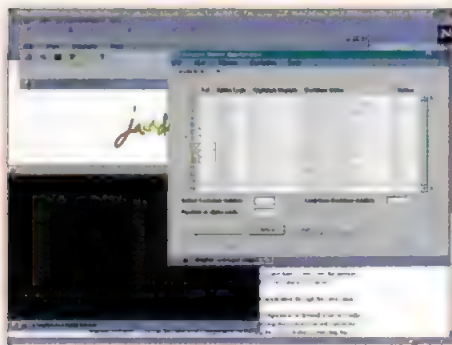
Traditional green-screen mode provides a text-only interface, and the keyboard is your only input method. Problems may arise, because Java prevents you from using the entire character set required for full terminal access. **Jacada** (\$20,000 for a 40 concurrent-sessions license), an emulation program from Client/Server Technology (800-773-9574, www.cst.com), attempts to solve this by reading

RESQ!NET: Dynamically enhance green screens.

the terminal screen and modifying its elements so that the layout works more like a Windows application. The program occasionally truncates characters and fields, so you may have to switch intermittently to green-screen mode.

ResQ!Net (starting at \$50

per user), from Advanced Transition Technologies (212-293-4814, www.att-inc.com), also dynamically reads screens as they come in and enhances their elements. For instance, function-key labels become clickable buttons and editable fields become editable Windows fields. Should you want to customize the environment further, the \$15,000 **ResQ!Net Studio** server software allows drag-and-drop programming of complex forms. —Larry Seltzer



JACADA: Flip from green screens to windows with ease.

BROWSER UTILITIES

There and Back Again

New browser add-on utilities are trying to overthrow the tyranny of the Back and Forward buttons. These standard browser buttons allow only a linear navigation path; in practice, though, you'll often want to skip to a URL that's not on the Back and Forward trail.

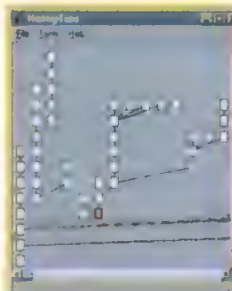
HistoryTree, available from

SmartBrowser Corp. for a \$10 fee (www.smartbrowser.com), makes it easier to access a page you came across but can't seem to locate again. **HistoryTree** offers a graphical view of your Internet odyssey via a small floating window that starts up when you launch your browser.

Each time you visit a new Web

page, the program adds a small icon to the chart, which parallels your surfing path. You can jump to any page by clicking on its corresponding icon. **HistoryTree** lets you easily edit and collapse the links in your tree, and you can also save trees in snapshot files for your own future reference.

Now that you can keep track



HISTORY TREE: Map your Web genealogy.

of where you've been, look to **NetJumper** to find out where you might be going. This \$19.95 browser accelerator, from the company of

(www.netjumper.com), tries to predict your future navigation. **NetJumper** installs a floating button bar on your system. As you surf, the utility creates a list of all the links on a Web page. Afterward, you can explore each link by clicking on the Forward button and opening the page in your browser.

NetJumper also lets you access any of these URLs directly from a list view that you can save as a file and share with others. Additionally, you can automate your surfing with **SlideShow**, an option that plays a succession of Web pages, either from the list **NetJumper** has built or by using URLs that you have added manually. —Michael W. Muchmore

INTERNET ACCESS

Free What?

Since its inception, the Internet has been all about getting free stuff: software, information, long-distance calling and faxing—recently, even e-mail. Cincinnati-based **Tritium Network** (513-791-9134, www.tritium.net), from InterAd Group, offers free, unlimited access in exchange for detailed user information. Cyber Freeway and @bigger.net, which service the San Francisco Bay Area, also offer free

access, but they require users to pay an initial set-up fee. Tritium plans to subsidize its fees and operating costs completely through advertisements.

After installing the company's software, you connect to the Internet via the Tritium icon, which also launches a horizontal, always-on-top ad window. Its proprietary push technology, called Ad-Path, lets users flip through ads, play streaming video clips from advertisers, and click through to advertisers' Web sites.

Tritium will initially target users who are already online, so you must supply your own browser and e-mail client. As the company grows, it may bundle a browser with its dialer and Ad-Path software. You can get the software via mail or as a download from the company's Web site. —Regina Kwon

AD VALUE: Using Tritium's ad banner, click through ads and play streaming video clips.





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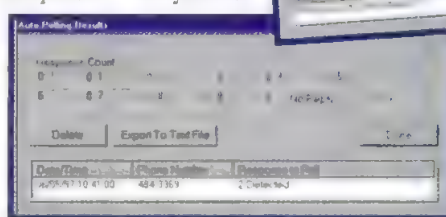
American Network Systems' **Total E-Call** (\$200 street) boasts more than 60 telephony, voice recording, e-mail, and logging features, and it includes the voice-modem card you need to link your PC and phone.

Total E-Call can be set to capture voice messages as .WAV files, facilitating the sending of voice mail over the Internet as sound file attachments. It can also forward both e-mail and voice mail to other addresses and alert you when new voice messages arrive via pager or phone. Support for voice mail messages in many popular languages is included. You can call from any location to play back messages through your PC.

The Caller ID feature interfaces with the Total E-Call Phone Book to display the contact record for an incoming caller. Another handy feature is Auto-Polling, which lets you prerecord survey-style messages through either the handset or your PC's microphone and send them to designated phone numbers taken from the Total E-Call Phone Book. The phone keypad responses are then recorded by the software and compiled in a spreadsheet-like Results screen.

Weighing in from Millenia

Software are the \$90 **Email Reader Plus** and its companion, the \$50 **Fax Sender**. Email Reader Plus uses AT&T's Watson voice-processing technology to convert the text of an e-mail message to voice. This lets you call your PC, listen to your e-



AUTO POLL-IT: Let Total E-Call automatically send out your phone poll and then process the results for you.

mail, and (through voice-recognition technology) manage your e-mail via voice commands. If you're using a public phone and outside noise prevents the voice recognition from working properly, you can use commands assigned to each number on the keypad instead.

Similar to Total E-Call, Email Reader Plus allows you to listen to voice mail stored on the PC using any phone. Your response is sent as a .WAV file via e-mail. You can also tell Email Reader Plus to forward an e-mail as a fax. Email Reader Plus works with Microsoft Exchange or any POP3- or MAPI-compliant system.

Fax Sender uses the same technology to send any Microsoft Office file on your PC's hard disk as a fax. Through voice commands, you tell the program which file you want to fax, or you can browse through the lists of files Fax Sender reads back to you, almost as if it were an audio incarnation of Windows Explorer.

From PC RoaR comes **PC Talk** (\$70 per suite; \$20 per component), a suite of three software

components: PC Log-It, PC QuickMail, and PC Chat. PC Log-It can record both sides of a conversation using a microphone or a telephone coupler. The recording can then be stored in a searchable database for later reference.

In conjunction with the \$249 NetBoard sound card—which does TrueSpeech compression on the fly—PC Quick Mail lets you manage voice recordings like you manage e-mail. Instead of having to listen to the recordings one by one, the user can choose a message; use the database to see the time, date, and sender of each message; and click on one to listen to it.

Sending a message from Quick Mail is easy: Simply record the message and click on the mail button to pop up an address book and select the recipient. With the Mark & Find feature, you can bookmark a moment in the recording and log a description of the content, making it easy to locate and jump to that reference point later. PC Chat, a component licensed from BoxWare, provides interoffice voice chat over a LAN.—Jennifer L. Anderson

NETWORK APPLIANCES

Intranet Serverettes

Until recently, if you wanted a small Web server you really had no choice but to invest in Web server software such as Netscape's FastTrack and a dedicated 486 machine to run it on. Then Cisco Systems came to town with its Micro WebServer (you can read our online review at www.pcmag.com), which changed the Web server market.

Now, network administrators can place a network appliance—smaller in size than the average collegiate dictionary and weighing less than a subnotebook—on a LAN for use as a departmental intranet or a small Web site host. It could even be used to support information kiosks.

Joining this growing market of network appliances are Compact Devices (800-894-0519, www.devices.com) and Mi-



BLOWN AWAY: The Twister Intranet Server provides 2GB worth of storage for your Web pages.

crotest (800-526-9675, www.microtest.com).

Compact Devices' \$1,295 **Twister Intranet Server** is a plug-and-play solution that can be managed locally or across a net-

work using its browser-based management application. The unit comes bundled with Claris Home Page and Net-It-Now, an intranet publishing tool.

An internal 1.2GB hard disk provides plenty of storage of data and Web pages. The Twister can be linked to your network either through a 10BaseT connection or through a 10Base2 connection using the unit's BNC port.

Able to sit on an Ethernet or Fast Ethernet network, Microtest's **Web-Zerver** (pricing unavailable at this writing) comes with embedded wizards that aid in a quick setup and configuration. Files and

Web pages can be stored on the WebZerver's internal 2GB hard disk or on any SCSI II-compliant external device, such as a Jaz, Zip, or CD-ROM drive.—Robert Daly

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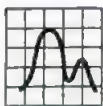
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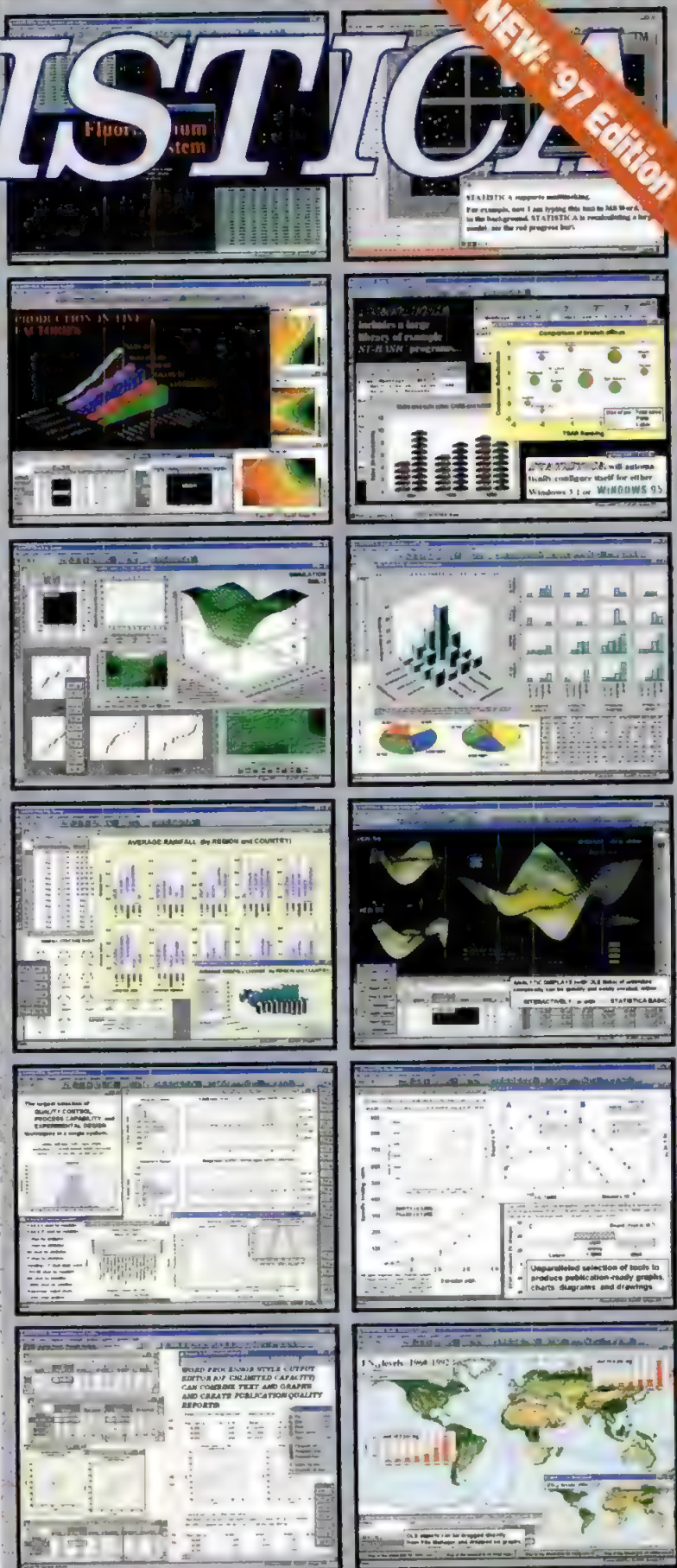
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Seeing clearly into the future

ADI

First Looks



Not Just Browsing

Netscape's Communicator 4.0 brings together e-mail, groupware, and browsing.—By Scot Finnie

Call it a browser war no more. The advent of Netscape's Communicator 4.0 signals the end of one battle and the beginning of another—the war of the Internet application suite. With this new product, Netscape teams up its well-known browser with an e-mail client, a group discussion manager, a Web page editor, a live-conferencing tool, and a push client to bring its vision of the full-service intranet within a networked enterprise one step closer to reality. Communicator also debuts several underlying technologies that climb to the next rung of the Internet experience.

The Navigator 4.0 browser is everything it always was, with slicker, more organized, and more fun-to-use controls. Messenger, Collabra, and Composer—the e-mailer, newsreader, and Web page design program, respectively—are improved in ways you're sure to like. Any-

one using a previous version of Navigator shouldn't think twice about making this upgrade.

Each program in Communicator 4.0 features considerable usability improvements over its predecessor. And some of the modules (notably Messenger) have new functionality that you'll notice right away. But a lot of what's truly new and exciting works behind the scenes. Much of this involves support for new server standards, new Internet technologies, and emerging Net usages, such as extranets, Web broadcasting, and Internet-based workgroup applications.

NETSCAPE COMMUNICATOR 4.0

Street price: Shareware, \$60 registration; Professional Edition, \$80. Requires: 8MB RAM, 18MB hard disk space (for Base Install version); Windows 3.1x, Windows 95, or Windows NT 4.0 (runs on a total of 17 platforms).

Netscape Communications, 501 E. Middlefield Rd., Mountain View, CA; corporate sales, 415-937-2555; personal sales, 415-937-3777

home.netscape.com

Circle 409 on reader service card.

For this evaluation, we looked at Version 4.0 of Communicator. As we were finishing this review, Netscape released Version 4.01 to fix a security hole found in Version 4.0.

DYNAMIC HTML

You won't find it mounted on a toolbar or mentioned on a settings screen, but Navigator's support of Netscape's version of Dynamic HTML is one of

the key enabling technologies that Communicator delivers. Among other things, Dynamic HTML provides presentation-graphics-like animation and transitions as well as support for overlapped graphics. This will all be used by Web page designers in myriad ways to improve the appearance and interactivity of the Web.

Messenger and Collabra share many underlying technologies, message formatting, and even a top-level interface structure called the Message Center. At last, each can launch independently of the browser. They also support LDAP (Lightweight Directory Access Protocol) and IMAP4 (Internet Message Access Protocol, Version 4) server protocols; both are open standards.

Other enabling features in Communicator aim at suite integration and support. For the first time, Netscape's Internet applications have a full-fledged local Help system: NetHelp. It's largely based in HTML, it's context-sensitive, and it can be customized by IS departments to contain additional information specific to a corporation.

INSIDE



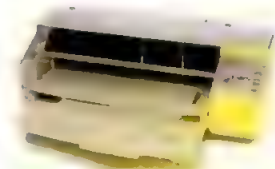
VIEW THIS: The Hitachi/NSA SuperScan Elite 751 is a superior 19-inch monitor and the first of its kind. See page 70.



HOME THEATRE: Gateway shows off its latest Destination PC/TV while Compaq joins the market. See page 62.



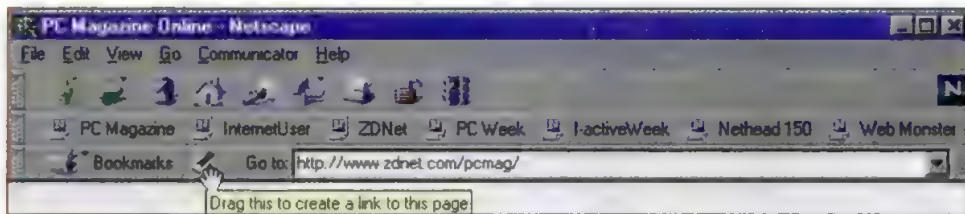
GETTING ARTSY: Dadaware's Embellish 2.01 helps OS/2 and Windows 95 users become creative. See page 73.



PRINT BIG: Huge ink jet printers from HP and Epson can help you print affordably. See page 76.

More Products Reviewed
Visioneer PaperPort Strobe...58
Visual Basic 5.0.....66

First Looks



YOUR CHOICE: The Personal Toolbar offers a space for you to customize the tool bar with your favorite bookmarks.

Similar to Microsoft Windows 95's User Profiles, Communicator's new multiple-user profiles and User Profile Manager utility let different users share a Communicator installation on a single PC. They also give each user the option of customizing Communicator's user preferences and bookmarks.

Security is another area to which Netscape devotes a suite-wide configuration tool. Security Info controls several security mechanisms, including 40-bit S/MIME e-mail encryption, digital signatures, code, and other types of certificates and passwords. New preference settings also let you completely disable browser cookies.

NAVIGATOR AT 4.0

Four attributes best describe Navigator 4.0: It's convenient and more fun to use; it's easier to install, upgrade, and configure; it provides excellent backward-display fidelity; and it provides for better page design and interactive content with a range of new HTML functions, such as cascading stylesheets, Dynamic HTML, and Dynamic Fonts.

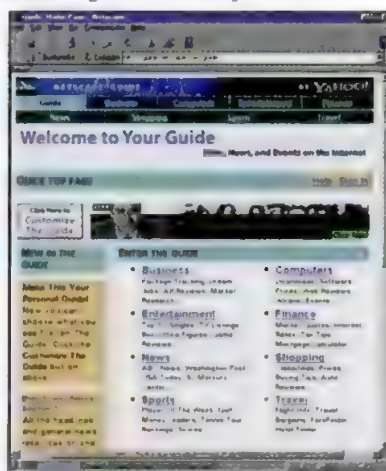
The improvements begin with the slick new Navigator

toolbars, which boast new animated 3-D buttons whose functions are easier to understand at a glance. Each of Navigator's three toolbars can collapse and expand with mouse clicks on the small friction pad. The main Navigation toolbar offers buttons for Back, Forward, Reload, Home, Search, Places, Print, Security, and Stop. The Location toolbar, containing the URL field, also provides a button that opens your bookmarks. The new Personal Toolbar provides a space for mounting custom buttons that link to your favorite sites. Navigator stores these custom links in the Personal Toolbar Folder.

But you don't have to mess with Edit Bookmarks to configure the Personal Toolbar. On the Location toolbar to the right of the bookmarks entry, there's a small green icon. When you drag and drop this icon, it makes a bookmark of the last page loaded by the browser. You can drag and drop to the desktop, into some appli-

cations, or onto the Personal Toolbar.

There are several other usability tweaks in Navigator. If you click and hold down the Back button, you'll get a dropdown list of links to Web sites you've visited during the current browser session. It isn't a reprise of the history list: Navigator's History window now



SIMPLY DYNAMIC: Presentation graphics-quality page layouts are among the benefits of Netscape's Dynamic HTML.

shows you all the sites you've visited, going back as many days as you've configured under Edit/Preferences. Another aid for getting where you're going on the Web is the Location field's AutoComplete feature,

which auto-fills site addresses based on URL history.

Netscape Navigator 4.0 includes better OLE, or ActiveX document support, so documents from Microsoft Office and other applications can be viewed and edited in the Navigator window. It also features the ability to resume downloads smartly after an Internet hiccup and offers fresh settings that limit disk usage in conjunction with e-mail and downloaded Usenet news messages. Also, all Communicator programs—not just Navigator—share a basic set of keyboard commands.

Those with slower Internet connections will appreciate the reorganized controls for preventing images, animations, JavaScripts, and Java applets from loading. Netscape automatically adds a button called Display Images to the main toolbar when you disable image loading. As you surf, you'll see placeholders for graphics, but you won't have to wait for them to load. And whenever you want to see the graphics on a given page, just click the Display Images button.

Netscape has also honed two areas of browser performance. The new Java just-in-time compiler supplied by Symantec boosts Navigator 4.0's performance when you open Java-enhanced pages. PC Labs' JMark tests showed Navigator 4.0's Java performance to be considerably faster than its predecessors for most tasks.

Navigator 4.0 also extends par-

PERFORMANCE TESTS



Java Performance in Web Browsers

	AWT Graphics Mix Score ▲	AWT Bits/ Images Score ▲	Vectors Score ▲	Hash Table Score ▲	Stacks Score ▲	Bubble Sort Score ▲	Quick Sort Score ▲
Netscape Navigator 4.0	5,952	293	1,901	2,699	1,722	5,494	14,928
Netscape Navigator 3.01	3,699	1,228	2,091	3,695	1,900	2,442	11,764
MS Internet Explorer 4 (preview release)	5,463	319	2,483	4,776	2,333	4,594	26,041
MS Internet Explorer 3.01	5,425	324	1,737	3,691	1,311	4,256	18,020

For these browsers, we ran our JMark 1.01 tests on a Pentium/200-based Micron PC running Microsoft Windows 95. More information about JMark 1.01 is available on our Web site at www.pcmag.com.

tial Java Development Kit 1.1.2 support, adding the ability to work with Java Archive (JAR) files and built-in Java and JavaScript Internet Foundation Classes for enterprise and third-party application development. Netscape also sought to improve the rendering of HTML tables with a refined tables layout engine. On our informal tests, Navigator 4.0 was sometimes faster and sometimes slower than Navigator 3.0 at this task.

MESSENGER AND COLLABRA

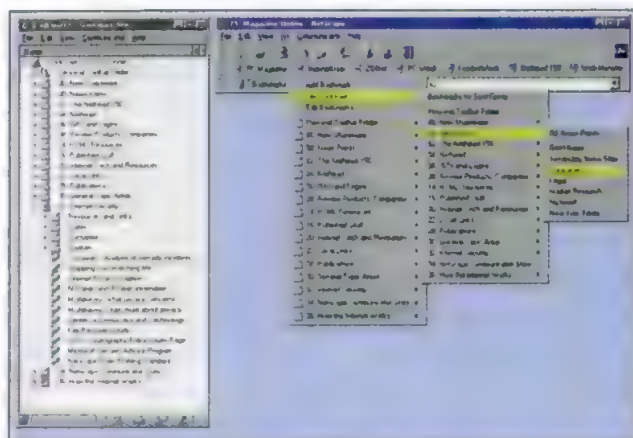
Navigator 4.0 may be the dream browser, but the programs once called Netscape Mail and

Many e-mail packages and newsreaders aren't yet capable of displaying HTML-based messages, so much thought went into making Messenger and Collabra work around this problem. User preferences let you decide whether to send messages as plain text, HTML, or larger multipart plain text and HTML messages. Two things make this process nearly invisible. First, by default, Netscape encodes messages for HTML only if you add links or formatting that would require HTML. And second, even with the default preference switched on (which always asks you to

choose a format before sending), you'll never see the HTML Mail Question dialog as long as you create plain text messages.

Many of us who read and send 50 to 100 or more e-mail messages per day don't bother with any kind of formatting, so these features works very well.

We can receive HTML messages, but we don't have to worry about formatting the messages we send. You can also train the Netscape address book to apply HTML automatically for individual e-mail addresses, all users at a given domain name, and even specific



FILE AS YOU GO: Now you can file bookmarks in subject-categorized folders as you're surfing the Web.

Usenet newsgroups.

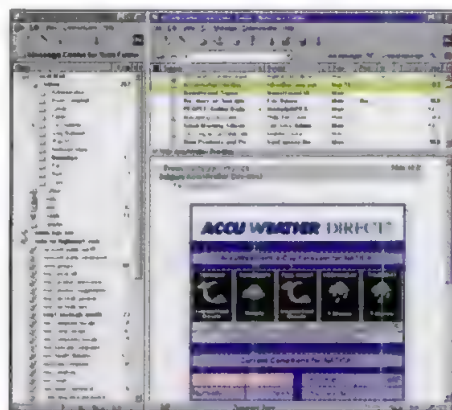
Messenger supports IMAP4, SMTP, and POP3 mail standards. It provides LDAP client functionality, so you can look up other users by their given names using the e-mail program's Search Directories tool. The dialog reaches out to servers such as Bigfoot, Four11, SwitchBoard, and WhoWhere to help you track down e-mail addresses and more.

If your company or your ISP upgrades to an IMAP4-based mail server, Communicator is ready to take advantage of it. Because IMAP keeps track of messages read or not read on the server (instead of leaving that function up to the client), you'll be able to log on to your e-mail from multiple locations and PCs and always start right where you left off. You also have the option of managing messages locally, so you can work off-line or continue working the way you have been under POP3.

Netscape spent a lot of time working on configurable message-list column headers for Messenger and Collabra as well as subscribed Collabra newsgroups, threaded message views, vCard support for extended personal organizer-like information in the Communica-

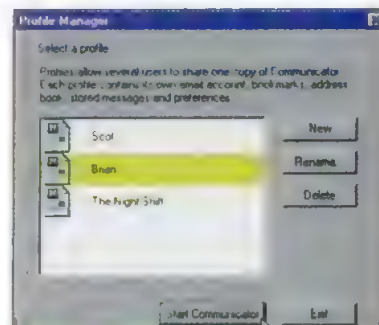
tor address book, and many other features aimed at heightening usability. But most of these features are overly complex or just not very useful. In fact, we think that Netscape has some work to do on the Messenger/Collabra interface, which tends to spawn message windows that get lost behind other windows.

There are several new features that are sure to please, such as support for hyperlinks that address Web pages and other kinds of Internet-based



THE MESSENGER COMETH: Netscape Messenger now supports sending and receiving HTML-based messages, including entire Web pages.

Netscape News get the award for the most improved. Messenger can create and receive graphical HTML-based messages, an advent that spawns a host of secondary benefits. And since Collabra shares a near-identical interface, this goes double for the new Netscape newsreader.



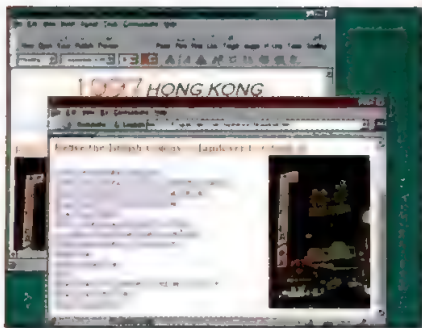
MULTIPLE USERS: It's easy to share a single installation of Communicator while retaining individual settings.

documents, newsgroup messages, and e-mail. Instead of sending a link to a page, you can just send the actual Web page—graphics and all—using the Send Page command in Navigator. You can even send Java applets in an e-mail message.

Collabra was developed with an eye toward serving as your company's intranet discussions

Towers of Hanoi Score ▲	Fast Fourier Transform Score ▲	Memory Allocation Score ▲	Graphics Threads Seconds ▼
2,075	1,608	278	5
1,294	770	158	11
1,830	1,079	278	8
1,829	1,090	243	8

First Looks



INSTANT WEB PAGE: *Composer doesn't provide WYSIWYG support for layouts, but you can use Navigator to preview how text wraps around an image.*

names rather than Usenet's dot-delimited names, as well as user-managed access control lists and discussion categories) depend on Netscape SuiteSpot 3's Collabra Server.

client. But a lot of the better functions (such as the ability for users to create their own discussions with friendly

access control lists and discussion categories) depend on Netscape SuiteSpot 3's Collabra Server.

For mobile and dial-up users, Collabra has good controls for off-line news reading, and it has gotten faster at downloading message headers. You can also bookmark newsgroups and postings, purposely ignore threads, or have Collabra watch specific threads for new messages. A tool-tip-like pop-up menu shows you an entire Messenger or Collabra subject header when a narrow column in the message-list window has truncated it. Even better is Collabra's ability to

search for a newsgroup address by keyword when you're not sure of the name.

COMPOSER

Netscape's Composer WYSIWYG Web page builder is back in second-generation form. It's finally as easy to use as a simple page-layout program or even a word processor.

If you're the kind of person who expects to type and see two spaces after a period, you're probably pretty disgusted with the Web. Composer performs

Netcaster Plays the Web

Even though Netscape's Netcaster is an integral part of the Communicator package, the content delivery vehicle wasn't ready in time to be included in the final release of Communicator. Instead, Netscape posted the beta 2 version, which we added to Communicator using the SmartUpdate feature. Netcaster is designed to deliver multimedia content from such name-brand content providers as ABC News, CBS Sportsline, CNN, Knight-Ridder, Money Magazine, Yahoo!, and ZDNet—all of which have signed on to support Netcaster's push scheme. The Marimba Java code-based channels include Corel's Office Suite for Java, two "Sesame Street" channels, and MapQuest's Interactive Atlas. Netcaster is segmented into two parts: the Channel Finder, which shows available channels, and My Channels, a list of channels that you handpick.

In addition to pushing content to Netcaster desktops (referred to as "Webtops"), Netscape is also offering off-line Web browsing capabilities as well as the ability to add any Web site to the Netcaster desktop for scheduled content updates. Netcaster also provides a graphical indicator when one of your selected sites updates its content. And since you can limit the cache size Netcaster permits for each content channel, you can at least influence the degree of disk usage, if that's your concern.

This raises issues beyond wasted disk space for corporate users on comparatively fast T1 connections, however. Sites with important news content that gets updated more than once a day may be better served by an update-notification mechanism that delivers a headline and perhaps a brief abstract. Some content changes so fast that surfing your cache from 2 hours ago becomes a waste of time.

Still, polling more frequently can be overkill and bandwidth-intensive, and it may even be prohibited in some corporate settings. Netscape is working on Netcaster functions that may address this usage.

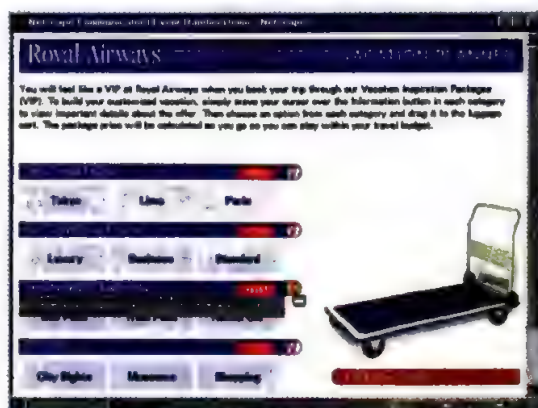
NUTS AND BOLTS

In operation, Netcaster beta 2 suffered from off-putting window behaviors. By default, the Webtop content-display canvas is maximized in the background. The Channel Finder and small Netcaster command toolbar are mounted on a vertical sidebar (or "drawer") that slides open from the side of the screen with a single click. The Channel Finder defaults to an Always on Top mode. When you click a link on the Webtop, a new instance of Navigator opens, sandwiched between the Webtop and the Channel Finder. Other programs you open can also land in this sand trap.

Netcaster's full-screen-size Webtop is nothing more than Navigator without the toolbars and window borders. Still, this is something of a blessing in disguise. While Microsoft touts the fact that its pushed-content canvas, the Active Desktop, is being designed into the operating system shell as well as the

browser, Netscape's far broader multiplatform support dictates a simpler, more portable approach. In fact, most of Netcaster's functionality is accessed via the Navigator 4.0 interface, heavy use of Dynamic HTML and JavaScript, and a sliver of Java code to hasten execution. When viewed from the programming perspective, Netcaster is downright ingenious.

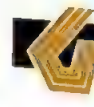
All in all, Netscape's Netcaster shows a strange mix of brilliant and lackluster aspects, at least in this prerelease version. We will reserve final judgment until Netscape ships it in final form.—SF



WEBTOP OF THE WORLD? *Netcaster beta 2 clearly shows some ingenious thinking, as well as some behaviors that may need rethinking.*

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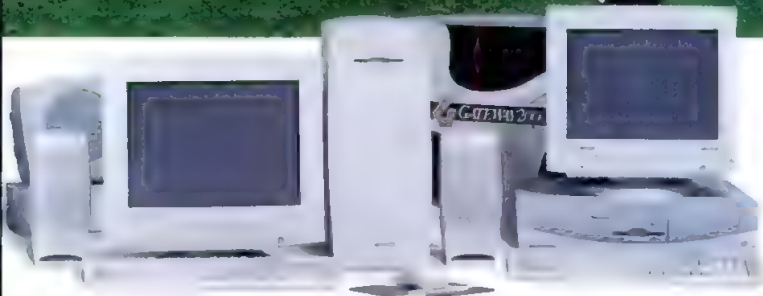
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Are you seeing the pattern here? We know service after the sale is when real customer satisfaction and loyalty happen. Once you join the Gateway customer family, the relationship is only beginning. You'll have a technical support friend just a toll-free telephone call away, 24 hours a day, to help patch things up when you and your PC don't see eye to eye.

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And for business, we've got a whole menu of service options that can do everything from building in special, third-party components and software, to helping you set up your network.

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- TelePath Modem for Windows with x2 Technology™
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad Pointing Device
- Wireless Field Mouse Remote
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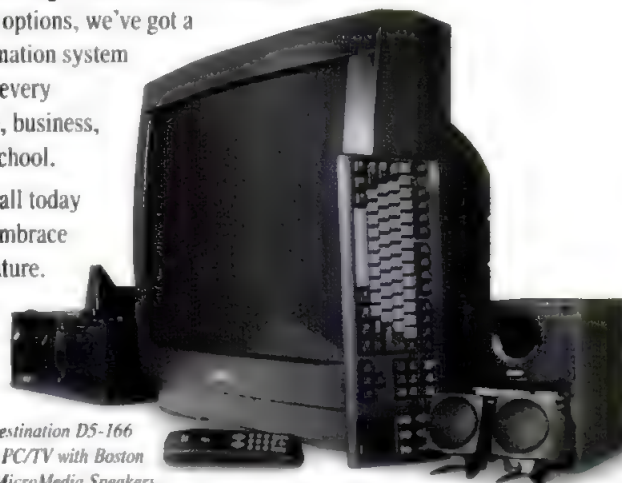
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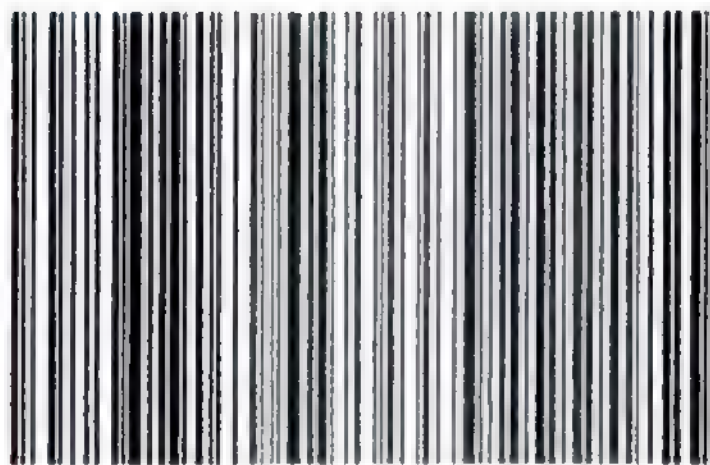


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Inverted Foldout slip-sheet



GbsSlipSheet-001

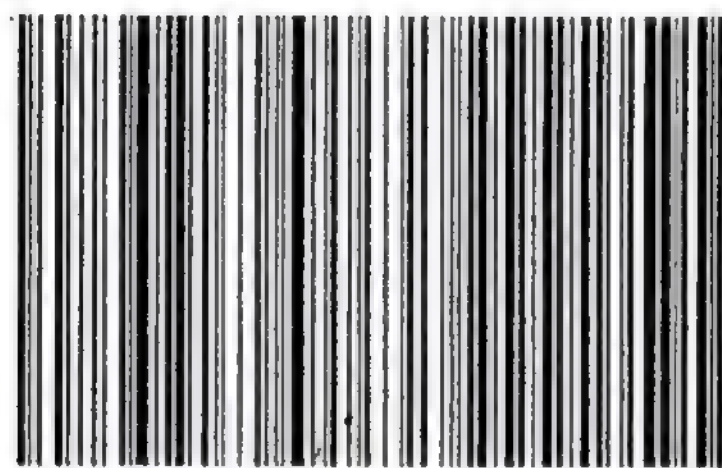
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

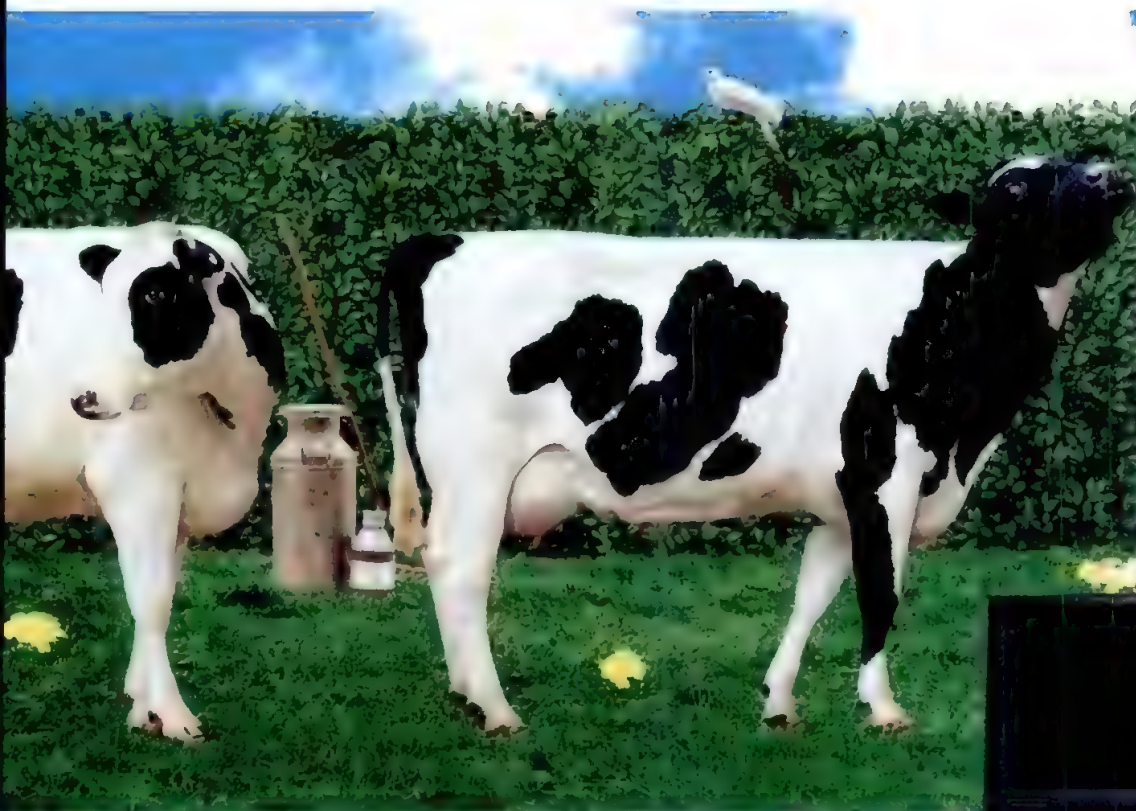
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Back

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1 Other end of connection must also be camera-equipped to see called party. Compatible with any standard H.324 or VDOPhone Internet video software.

2 All x2 products are capable of 56 Kbps downloads, however, due to FCC rules which restrict power output, current download speeds are limited to 53 Kbps. Actual speeds may vary. See www.usr.com/h2 for details.

3 Actual performance subject to line conditions and Internet traffic.

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First Looks

this function automatically by smartly inserting a nonbreaking space. It also publishes a document and all attendant linked elements with the click of a single toolbar button.

Composer handles table data, performs automatic image conversion when you drag and drop image files other than JPEGs or GIFs, and provides a new spell-checker. Finally, Composer supports plug-ins, a wonderful function that was not thoroughly implemented when we tested Communicator. Three Composer plug-ins

were available from the Smart-Update page, however, and one of them was a simple text editor that lets you directly edit the HTML on the page currently open in the editing window.

MADE TO UPGRADE

Communicator comes in many flavors, which is good news and bad news. There are six separate versions of the program just for the 16- and 32-bit variations of Windows alone. In the standard edition of Communicator, there are two download and installation packages: the

8MB Base Install and the 13MB Complete Install versions. The 15MB Professional Edition adds three components for corporate users.

Base Install includes Navigator 4.0, Messenger, Collabra, Composer, and NetHelp. The Complete Install version adds the Conference H.323 net phone and whiteboard collaboration tool. It also includes support for multimedia with plug-ins that play audio, LiveVideo and QuickTime video, and 3-D VRML. In beta, Netcaster was a separate add-on download.

The Professional Edition adds Netscape's new Calendar, which is a good workgroup scheduler. There's also a Web-based 3270 host emulation program called IBM Host On Demand. The third piece of the Professional Edition is AutoAdmin, which provides client-based support for the centralized Communicator configuration and program-update management tool (available with the Mission Control administration tool, formerly called the Netscape Administration Kit).

An End Run for Microsoft's IE 4.0 Strategy

A lot has changed since we first examined Internet Explorer 4.0 back in the spring (First Looks, April 22, 1997). As you read this, at least some of the new features should be available in public beta, and the shipping version of Internet Explorer 4.0 should be close at hand.

One of the big changes is a beefed-up features set and a new interface for Outlook Express Mail and News. There's also refinement in the works for Active Desktop, Dynamic HTML, and even some browser-specific functions. But most of all, Microsoft is readying a major reworking of its user interface as well as its smart pull-content and splashy push-content delivery mechanisms.

The Outlook Express part of the equation is a bit hazy, but the general news is good. Expect to see Outlook Express Mail take on some of the smart interface ideas and powerful capabilities of Microsoft's Outlook personal organizer and workgroup scheduling and communication client. Outlook Express, which supports both IMAP and LDAP server protocols, will be able to process HTML-format messages for individuals whose e-mail packages don't support HTML.

TWEAKS IN PROGRESS

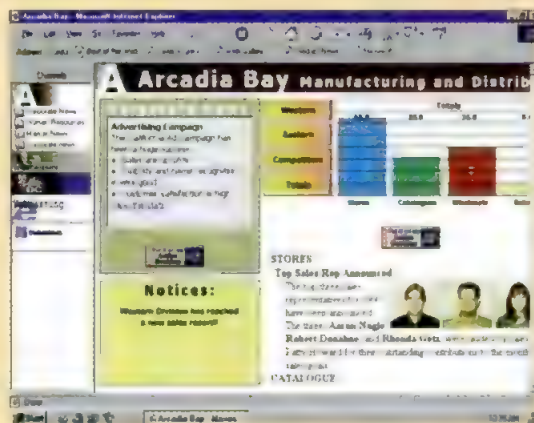
Internet Explorer 4.0 is a heavy "usability" upgrade over IE 3.0 and Windows 95, with HTML everywhere and built-in browsers on the desktop and in all Explorer windows. Multiple Taskbars, single-click launching, and the ability to rearrange Start Menu items by dragging and dropping them are also included in the new version.

One of the browser's new interface structures is the "bar," a vertical column that pops open on the left side of the browser win-

dow in response to the click of a toolbar button or menu selection. There's a simplicity to this, since the contents of IE bar panes are stored locally and on Internet servers. Microsoft is planning at least four bar types, including the Search Bar, Favorites Bar, History Bar, and Channel Bar. The History Bar, for example, will present a hypertext list of pages you've visited, so you can rapidly find one and revisit it.

BACK TO THE DRAWING BOARD

Microsoft's variation on Dynamic HTML is undergoing a number of refinements. First off, to avoid confusion, the company moved its ActiveX multimedia browser controls out from under the aegis of the marketing term "Dynamic HTML." There's a new active cursor tag that relies on cascading stylesheet filters, which also provide some multimedia-like transitions based in HTML. Internet Explorer's Java support extends to Java Development Kit 1.1 and JavaScript 1.1, and it even gets a performance-tuned just-in-time Java compiler.



CHANNEL IT: Microsoft's Channel Bar for its Webcasting desktop, shown on the left of this prototype version, will have a Channel Guide button that leads to a page of available channels. IE 4.0's modified toolbars now make use of the space to the right of the main menu.

SUBSCRIBE AND CONQUER

At Microsoft, content delivery breaks down into two areas: site subscriptions and channels, which correspond to content pull and content push, respectively. These activities further break down into two classes of content interaction, which is probably best described as content update precaching and content update notification.

Off-line Web browsing is the first aspect of Microsoft's pull-oriented subscription feature set. It lets you choose Web sites that IE will periodically poll for content updates. Once located, this updated content will then be downloaded automatically to a

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First Looks

SmartUpdate will clear up a lot of version confusion for Communicator users. This feature automates the process of downloading and installing program updates to any installed version of Communicator. As a result, the best approach to getting Communicator running on your system may be to download and install the smaller Base Install version and then handpick additional components using SmartUpdate.

Third-party Communicator plug-ins from companies such as Macromedia and Progressive

Networks also are available. Lost in the upgrade from Navigator 3.0x are your installed plug-ins; these must be reinstalled. But support for self-installing plug-ins in Netscape's new Plug-in 4.0 API should greatly reduce headaches.

PERSPECTIVE

The release of Netscape Communicator 4.0 ushers in an exciting new era for corporations, end users, and applications developers alike. Just as the advent of business productivity suites changed the face of the

software market, so should Communicator (and soon, IE 4.0) change the way corporations do business both internally and externally.

There is no doubt that Netscape has set its sites high for this Internet applications suite; in fact, the company's vision for its future revolves around the networked enterprise, with Communicator as the hub. But does the new product deliver?

Communicator definitely represents a giant step forward for Netscape. The prod-

uct integrates new technologies—including Dynamic HTML and support for LDAP and IMAP4 server protocols—which make major strides toward promoting an open, cross-platform environment. And this platform independence can be a means of lowering total cost of ownership as well.

Stay tuned to this space, for the real battle of the Internet application suites won't commence until Microsoft ships Internet Explorer 4.0, expected at summer's end. □

Microsoft's IE 4.0 Strategy (continued)

local cache. This allows you to surf updated content off-line.

Microsoft has also revamped IE 4.0's site-subscription interface to let you fetch a site for off-line browsing. Or you can configure the subscription to notify you whenever a site changes. The new Subscription Wizard simplifies the process of configuring subscriptions for Favorites.

WEBCASTING

You can subscribe to any Web site with IE 4.0. Meanwhile, content authors don't have to lift a finger to support pull-content activity. Thanks to what Microsoft has dubbed "Webcasting," IE users can receive HTML, JavaScript, Java, ActiveX, and any other type of Web content as pushed channels that appear on the new IE 4.0 Channel Bar. Webmasters can set their sites up as IE 4.0 channels by adding a simple text-based CDF file to each site.

According to Microsoft, any Web site can offer its content from any server as a channel that can be received by any Internet Explorer 4.0 (and third-party) client desktop on the Internet. The CDF file can also set update schedules, specify portions of a site's content to Webcast, and create a content index or site map.

Webcasting has three modes, which resemble IE 4.0's subscription features: automatic reception of whole chunks of content, simple notification in the Channel Bar (such as fresh headlines), and a hybrid consisting of an e-mail message that contains the top-level HTML page of a site's updated content. As with the subscription features, there's also a Channel Subscription Wizard that makes short work of picking and configuring Webcast channels. The easiest way for you to launch this wizard is by

clicking a subscription link posted on a CDF-enabled Web site.

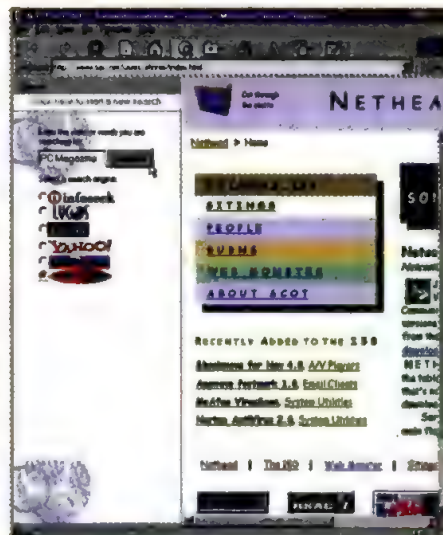
There are also some hidden strengths to Microsoft's design. For one thing, the company has pledged to make IE 4.0's Channel Bar work with content designed for Netscape's Netcaster. The Webcasting architecture can support the multicasting (or broadcasting) of content on the Internet from one or many sources simultaneously, without degrading real-time communication. Multicasting makes use of specialized network hardware and targets intranet and extranet applications. Webcasting is also extendible to the consumer version of multicasting, which Microsoft calls the Broadcast Architecture for Windows (an announced technology that is currently under development).

IE 4.0 also has a feature called package management. This will

work with any HTTP server to push content, applications (both Java and ActiveX), and application updates directly to the desktop. Package management will be integrated with CDF and provide a unified location for updates. It won't require a specialized back-end solution. If you think this all sounds like Marimba's Castanet, you're right: Microsoft is positioning package management as direct competition.

Microsoft has lined up many supporters for IE 4.0, including 13 push vendors, 5 tool developers, nearly 2 dozen content developers, and nearly a dozen systems integrators.—SF

Microsoft Internet Explorer 4.0 (beta). Price: Free. Requires: 486/66-based PC or better, 8MB RAM (for Windows 95) or 16MB RAM (for Windows NT), 43MB hard disk space, Windows 95 or NT 4.0. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com/ie/default.asp.



BAR EVERYTHING: The Search Bar pops open on the left side of the Internet Explorer 4.0 window without expanding the browser's size on your desktop. Microsoft is also adding a Webcasting Channel Bar, a Favorites Bar, and a History Bar.

The Mac OS Report

Number two in a series—the facts about Mac OS 8

Mac OS 8 is coming. It will give you, and millions of other Macintosh users, a whole new way of working.

It will give your Apple Macintosh computer (or, for that matter, any other Mac OS computer of your choice) a dramatic new look and feel, along with all kinds of enhanced capabilities for accessing the Internet.

It will also set an entirely new standard of powerful, intuitive computing—a standard the competition can try to catch up to. (Again.)

A new way of working

The moment you start using Mac OS 8, you'll feel the difference: you'll find yourself accomplishing more in less time. A multi-threaded Finder lets you execute multiple tasks simultaneously, such as launching applications and copying files. Mac OS 8 includes new information-management tools, such as contextual pop-up menus and spring-loaded folders, that give you quicker and easier access to all your information. A scalable environment lets you either limit your menu and window options, or expand them—whichever works better for you. A new, dimensional look makes the interface more dynamic and engaging than ever. And Mac OS 8 also includes the latest versions of QuickTime with its MPEG support,

QuickTime VR and QuickDraw 3D.

How easy is it to get going with all these new technologies and features?

Very. Because our new installer and setup assistants take you through each step of configuring your new system

software. Once you're up and running, PowerPC™-native code improves your performance. Mac OS 8 is also completely compatible with all PowerPC and 68040-based hardware and software.

A new way of accessing the Internet

Mac OS 8 includes TCP/IP and PPP for easy network or modem access direct from the Finder. You get Netscape Navigator, Microsoft Internet Explorer and the PointCast Network. And a new Internet Setup Assistant makes it easier than ever to get on the Net, whether you're doing it from home with a modem or from work with a high-speed connection. Personal web sharing is standard, so you can turn any Mac into an Internet web server. And Java™ support is built in, so you can run Java applications just as though they were any other desktop applications. (If you were wondering, Windows 95 can't do this.)

And more advancements are on the way

Mac OS 8 is one of the most significant advances in OS technology ever. And it's just the beginning—additional upgrades are planned. And our support for the Mac OS will continue for years.

At the same time, we're also working on an industrial-strength OS, code-named Rhapsody, that will offer features such as protected memory, preemptive multitasking and symmetric multiprocessing. Rhapsody will also provide backwards compatibility, so you can be sure that the vast majority of your Mac OS apps will run on Rhapsody, too.

In other words: Apple is still developing the most innovative, user-friendly and consistently superior products on the market. That's one part of our system that won't change. To learn more, visit www.macos.apple.com.



If you want to use Netscape Navigator to browse the Net, you'll like this. It's an integrated part of Mac OS 8.



Microsoft Internet Explorer fans will be happy to know that this powerful web browser is also built right in. Choice is just one of the many Mac OS 8 motifs.



It's the PointCast Network. It comes with Mac OS 8. And it grabs the news you want directly off the Net to create customized desktop news pages. Daily. Hourly. As often as you want.



When you get Mac OS 8, you also get built-in Java support, so you can run both local and network-based Java software just like other desktop applications.



Mac OS

Mac OS has always been the easiest and most intuitive of all operating systems. Now, Mac OS 8 brings this kind of computing to a whole new level.



THE PERSONAL
DAN O'BRIEN
decathlete



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CIRCLE 217 ON READER SERVICE CARD

First Looks

PERSONAL SCANNERS

Scan Color with Speed

Visioneer's new sheet-fed PaperPort Strobe offers quick and easy color scanning.—By Alfred Poor

If you've been waiting for a personal desktop scanner that can handle your color snapshots as easily as it can scan your business cards, Visioneer has the answer. The new PaperPort Strobe, with an estimated street price of \$300, gives you 300-dpi scans with incredible ease.

The charcoal-gray unit is slightly larger than 11 by 3 by 2 inches (HWD), making it small enough to fit on a crowded desktop. A simple sliding hatch makes it easy to direct originals through either the front or back of the unit.

The PaperPort Strobe has a cable that connects to your computer's parallel port and a printer pass-through port. A single 6-foot cable extends from the port housing and plugs into the supplied power brick, making it easy to place the scanner wherever you want.

Using the Strobe is simple: Just insert a sheet of paper into the input slot and the scanning software will automatically start to scan. The scanning process itself is fast. Using the default settings, it took less than 15 seconds to scan a 4- by 6-inch snapshot, less than 7 seconds for a letter-size sheet for faxing or filing and less than 5 seconds for a business card. It took additional time to process the data, which varied depending on the type of image.

Fast scans are of little use if they aren't accurate, but the Strobe did a wonderful job. Images scanned for OCR (optical character recognition) and faxing came out crisp and clear. Photo images were good, but not great. There was noticeable vertical

striping on some images with a solid dark background, but these flaws only show up under enlargement and probably won't be a problem for



SPEEDY SCAN: A letter-size sheet scans in less than 7 seconds.

casual printing. You should consider a flatbed if you want a professional-level color scanner. But most users will be more than satisfied with the results from the Strobe.

The software setup is also easy. Microsoft Windows 95 users can select the AutoRun feature on the provided CD. This installs the required drivers and allows you to install the other software on the CD.

The most important software in the bundle is PaperPort 5.0, which serves as the primary interface for the scanner. The program uses a desktop metaphor, where your scanned images appear either singly or stacked in groups. The desktop also contains folders, making it easier to organize your documents (you can only have one layer of folders, however).

Double-click on an item to make a variety of changes to the image. For documents, you can add annotations (for filling in a form, for example), highlight, re-

move stray marks, or rotate the image, among other options.

There are a wide range of new edit features designed to make it easier to improve color images. The AutoFix feature will adjust contrast, brightness, and other settings to improve a scan with a single click. If you prefer to make your own choices, the picture adjustment feature lets you choose between brightness, contrast, color, and tint settings.

Instead of moving sliders or entering values, you can choose between eight alternatives to the current picture; just pick the one that looks best to you. And a new red-eye-removal option makes it a snap to clean up flash portraits.

The software comes configured for four standard tasks: storing color photos, preparing text for OCR, filing business cards, and faxing, filing, or copying. Each task has its own setting, such as 200-dpi black and white for faxing and 100-dpi, 24-bit color for photos. You can also choose your own settings—up to 300 dpi for color and gray-scale images or 2,400 dpi (interpolated) for

the PaperPort link feature.

Perhaps the most popular feature of the PaperPort software is its ability to link with other applications. Icons for linked applications appear in a toolbar along the bottom of the screen. Just drag an image from the desktop and drop it on the icon. PaperPort will then process the image appropriately, launch the application, and load the data from the image.

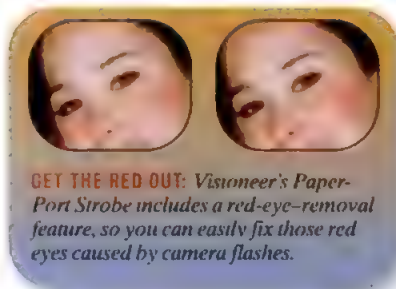
For example, if you drop an item on the Word for Windows icon, the image will be processed by the bundled Xerox TextBridge OCR and the formatted text will load in Word. Drop an image on the Microsoft Paint icon and you can edit the image within Paint.

The software bundle also includes four applications that make the scanner instantly useful. CardScan LE from Corex makes it easy to grab data from business cards (you must upgrade to the full version in order to export the data for use by other programs, though). Quick-Expense SE helps you manage expense receipts, and Connectix QuickCards LE lets you create custom greeting cards. If you want more control over your graphics editing, use Picture Works PhotoEnhancer, which provides a range of sophisticated graphics editing tools.

As color becomes an integral part of our computing environment, color scanning is becoming more and more important. Just as color ink jet printers have changed the

face of the printing market, the PaperPort Strobe has affected the scanning market by making it fast, easy, and affordable to add color input to your computing system.

PaperPort Strobe. Street price: \$300. Visioneer, Fremont, CA; 800-787-7007, 510-608-0300; www.visioneer.com. Circle 408 on reader service card.



GET THE RED OUT: Visioneer's PaperPort Strobe includes a red-eye-removal feature, so you can easily fix those red eyes caused by camera flashes.

black-and-white images. These settings can be accessed from the PaperPort window. Or you can press a button on the side of the scanner to open the options screen. You can also export any desktop image using a wide range of file formats, easing the process of importing the data into applications that aren't supported by

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BREWED BY



First Looks

PC/TV

Big Screens Rev Up

Compaq enters the PC/TV market while Gateway rocks with DVD and Pentium II. —By Bruce Brown

If you've been questioning the viability of PC/TV, stop procrastinating and get out your checkbook. The two newest systems in this category—from industry leaders Compaq Computer Corp. and Gateway 2000—are likely to convert skeptics.

Compaq is the latest company to bring a PC/TV to market (to do so, the vendor has joined forces with RCA). The Compaq PC Theatre's centerpiece is its 36-inch multimedia monitor; on the PC side, it boasts a speedy 200-MHz Pentium MMX CPU, 40MB of RAM, and a 3.8GB hard disk. This setup sells for \$5,000 (street price) in selected markets, with rollout across the country expected by the end of the year.

Gateway 2000, never known for resting on its laurels, has revved up its Destination Big Screen PC/TV once again, this time with a 266-MHz Pentium II processor and a DVD drive. The Destination D6-266 with 64MB of RAM, a 6.4GB hard disk, a 31-inch monitor, and a Dolby Pro Logic sound system sells for \$4,849 (direct).

There are significant differences between these two systems. The Compaq's screen is bigger and brighter than the

Gateway's, and its on-screen user interface can't be beat for selecting between the bundled and consumer-added electronic components.



Meanwhile, the Gateway system is faster, and its DVD drive gets you ready for the scads of entertainment and computing titles on the way. Both products are big-ticket items, but either can become the core of a home entertainment, education, communications, or productivity system that will be the envy of your neighborhood.

DESTINATION D6-266

A Toshiba DVD drive (which reads standard CD-ROMs at 8X speed) is the Gateway Destination Big Screen PC/TV D6-266's top addition, simply because it opens up new possibilities in audio and video entertainment. If you're looking for a PC/TV to use as a computer first, the hot CPU will definitely grab your attention. But if en-

sound) support, but AC-3 receivers are rare and expensive right now. We did test the system with a Harman Kardon AC-3 setup and found that the combination produced overwhelmingly convincing sound for this medium. Once the prices come down, we'd definitely recommend upgrading to an AC-3 system.

The Destination's adept

PASS THE POPCORN: Gateway's Destination features a DVD drive, so you can watch movies on its 31-inch monitor.

tainment is your prime motivator, the DVD drive is a definite knockout.

The Destination's bundled Harman Kardon Dolby Pro Logic receiver and six-speaker set works well with audio played through the 16-bit wavetable audio card. The DVD specification also includes AC-3 (five-plus-one-channel direct digital

CPU (with 512K L2 cache) and 64MB of EDO DRAM produced high CPU scores and helped the machine attain a top ZD Winstone 97 score. The unit's Quantum Fireball ST 6.4GB hard disk also scored very high. Its STB VideoRage 2 graphics adapter with 2MB VRAM and integrated TV tuner posted a respectably high ZD Business Graphics Win-

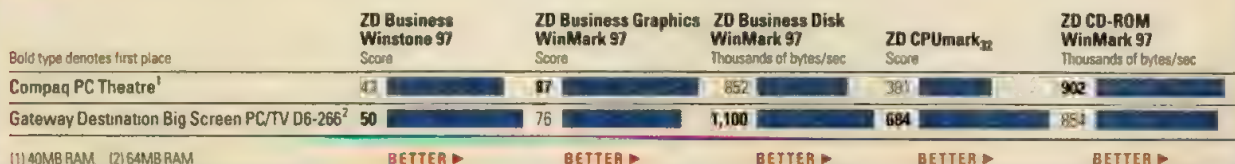
BENCHMARK TESTS

PC/TVs



On our benchmark tests, the Gateway Destination beat the Compaq Theatre on the Winstone, Disk WinMark, and CPUmark₃₂ tests. But in view of the Destination's speedier 266-MHz Pentium II and extra

memory, these results are not surprising. (The Compaq has a Pentium MMX/200 and 40MB of RAM.) On our Graphics WinMark tests, however, the PC Theatre took the lead, outdistancing the Destination by 15 percent.



Mark 97 score, but it wasn't as high as that produced by the Compaq PC.

The Destination's 31-inch monitor displays a maximum 720-by-480 resolution (down from a possible though nonofficial 800-by-600 supported in earlier versions). The 640-by-480 mode now supports 16 million colors, and the screen can run at a flicker-free 75 Hz. When watching video—whether from cable television, a VCR, or a DVD input—you can't tell the difference between this monitor and a conventional TV set.

This system also includes a 33.6-Kbps modem, a wireless keyboard with touchpad, a wireless remote with an integrated trackball, an EasyPhoto Drive for near-instant photo scanning, and a variety of educational, entertainment, reference, and productivity software titles. Buyers can also choose one feature-length film on DVD. Television access is controlled by Intel SmartTV (formerly Harmon Smart TV), and a subscription for a weekly TV Guide download is \$5.95 per month.

The Destination's warranty covers the system for three years (except the monitor, which is backed for one year), with on-site service included for one year. Both the on-site and monitor coverage can be extended to three years.

The D6-266's screen gives up size to the Compaq PC Theatre, but its fast processor and hard disk will significantly speed your computing tasks. The hot and capable DVD/CD-ROM drive puts a capital "E" in entertainment for this latest Destination.

Gateway Destination Big Screen D6-266. Direct price: With 266-MHz Pentium II CPU, 64MB RAM, 512K L2 cache, 6.4GB hard disk, DVD drive, 33.6-Kbps internal modem, Harman Kardon receiver with six speakers, 31-inch monitor, \$4,849.

Gateway 2000, North Sioux City, SD; 800-846-2000, 605-232-2191; www.gw2k.com. *Circle 406 on reader service card.*

COMPAQ PC THEATRE

The Compaq PC Theatre has an awesome Thomson Consumer Products/RCA 36-inch monitor along with an extremely usable interface and a variety of impressive input devices. This system may be the ultimate PC/TV for the consumer electronics market.

The PC Theatre features a 200-MHz MMX Pentium processor, 40MB of EDO DRAM (expandable to 128MB), and a 3.8GB hard disk. On our benchmark tests, the PC Theatre took a back seat to the Destination with its CPU, Winstone, and Disk WinMark scores (however, the Destination was equipped with a Pentium II processor and more memory). But on our Graphics WinMark test, the unit's Tseng Labs ET6000-based graphics adapter surged ahead, and its variable-speed Hitachi CD-ROM drive (16X maximum) grabbed top honors on the CD-ROM WinMark 97 test.

The PC Theatre is most noticeable for its 36-inch monitor (with Invar Shadow Mask for precise screen geometry) and for its features that enhance focus and sharpness. Weighing in at a hefty 180 pounds with integrated 5-watt speakers, the Compaq's monitor requires care in moving and positioning. A sturdy and attractive \$299 TV and component stand with casters is a must-have addition.

Picture quality matters a

great deal with a large-screen TV, and the Compaq's image is big, bright, and beautiful. The maximum resolution in PC mode is 640-by-480 at a 60-Hz vertical refresh rate, but the screen's clarity and tinting reduce the flickery effect of the

connectors. When testing with a home entertainment setup (including a VCR, laser disc player, and Sony PlayStation), it was easy to find connections for all the components. It was even easier to use them, thanks to an intuitive on-screen selection

menu. An attractively rounded wireless infrared keyboard with an integral trackball, a huge infrared remote control with lots of well-marked buttons and another trackball, and a hardwired Phazer game controller round out the hardware.

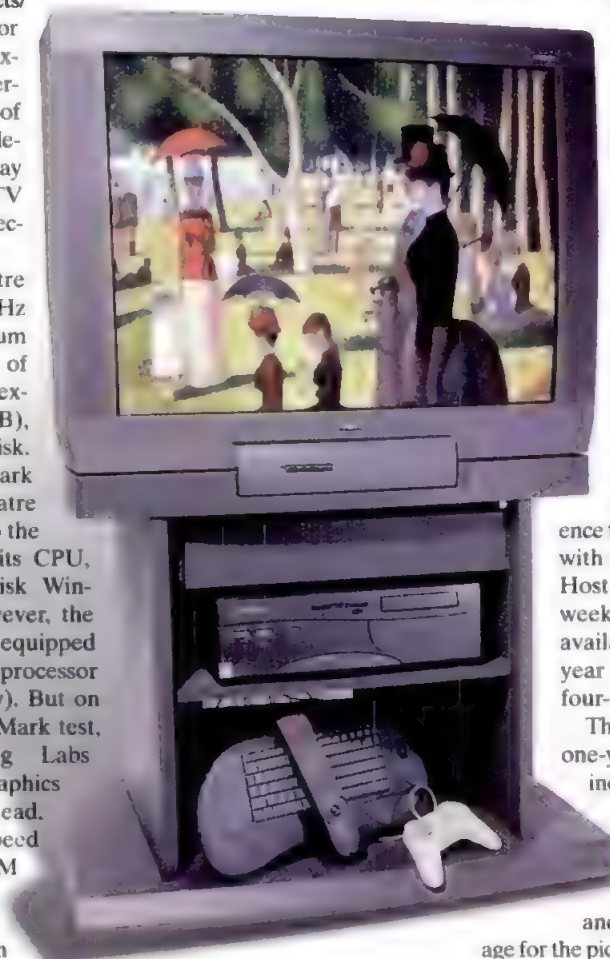
This system's software bundle includes several game and reference titles. It also comes with an Electronic TV Host program, with weekly downloads available for \$49.95 a year after an initial four-week trial period.

The PC Theatre has a one-year warranty that includes on-site service. RCA provides one-year coverage for the monitor

and two-year coverage for the picture tube.

The Compaq PC Theatre is an impressive first offering in the PC/TV market. Its large screen and easy-to-use interface suggest that Compaq and RCA will do well with their partnership.

Compaq PC Theatre. Street price: With 200-MHz Pentium MMX CPU, 40MB RAM, 256K L2 cache, 3.8GB hard disk, 16X Max CD-ROM drive, 33.6-Kbps modem, 36-inch monitor, \$5,000. Compaq Computer Corp., Houston, TX; 800-345-1518, 281-370-0670; www.compaq.com. *Circle 407 on reader service card*



BIG, BRIGHT, BEAUTIFUL: The centerpiece of Compaq's PC Theatre is its 36-inch monitor.

relatively low scan rate. The Compaq system unit includes two 181-channel TV tuners for picture-in-picture without a VCR. The ESS audio circuitry includes Matrix surround sound for 3-D audio effects with just two speakers, but the system also accommodates an external audio setup.

To add home audio and video components, there are three sets of composite RCA connectors and two S-Video

No guts. No glory!

When we say



Shown above
Model PT775

- ViewSonic PT775**
- 17" CRT Size
 - 16.0" Viewable
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 - 96 kHz Horizontal Scan Rate
 - 1600 x 1200 @ 77Hz
 - Maximum Resolution
 - TCO Compliance
 - Plug & Play *

- ViewSonic PT813**
- 20" CRT Size
 - 18.0" Viewable
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ViewSonic®



ViewSonic PT813
PC Magazine's Editors' Choice
June 1997

**The PT813 and
PT775 are winners.**

ViewSonic monitors have again been enthusiastically received by distinguished industry reviewers. Our PT813 was honored as *PC Magazine's* Editors' Choice (June 24, 1997). They said, "...ViewSonic—not NEC or Sony—is the largest purveyor of 20- and 21-inch monitors in the U.S." They called the PT813's image quality and features "excellent" and its price "attractive."

The PT775 has also been praised. *PC World* calls it "... tops for graphics pros," and makes it a coveted Best Buy (July, 1997). They rave about its "super brilliant images" and "rich, vivid colors." Of course, we knew all along these two monitors would exceed your expectations.



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www.viewsonic.com.

ViewSonic PT775
PC World's Best Buy
July 1997

First Looks

DEVELOPMENT TOOLS

Going Beyond the Basics

Visual Basic 5.0 adds a new programming paradigm and much more.—By Barry Simon

Microsoft Visual Basic 5.0 is clearly the most significant and important upgrade to come along since VB 2.0. With such major enhancements as the Integrated Development Environment (IDE), native code compilation, and a simplified process for writing code, this upgrade will be welcomed by programmers.

There are now six editions in the VB family. At the core is the traditional trio of versions for creating standalone applications: the \$499 Professional Edition; the \$1,199 high-end Enterprise Edition; and the \$99 low-end Learner's Edition.

THE IDE

The first change in VB 5.0 that you'll note is in the interface. In the past, VB's windows sprawled across the screen, making it difficult to switch between tasks briefly. With the introduction of the IDE, there is now essentially a single window surrounded by lots of smaller windows.

The default view places the main project window at the upper right of your screen. It's modeled after a file tree, which allows you to work on multiple projects at once; this is essential if you're going to write and debug an ActiveX control while using it in a sample application.

You'll also find property sheet and form-layout windows along the right, and a control palette docked on the left. Each of these windows can be either free-floating or stationary. A tabbed interface lets you have multiple sets of controls, and you can save sets of controls on tabs and load them when you need them. The property win-

dow has two tabs—the traditional alphabetic list tab, and a tab that groups properties by function.

A new forms-editor floating toolbar adds the functionality that used to come from third parties. It allows you to align several controls, or make them the same

for that object appears. Pick a property, hit equal, and a list of allowed values appears! This feature is useful as a device for avoiding having to remember long property names.

Intellisense has another advantage over its predecessor. When we tried to write a small applet with the VB 4.0 MAPI control, we discovered by looking at a sample application that the writers of the help and printed documentation had forgotten to list an allowed value. Intellisense's drop-down

duce Active Documents that allow you to run VB applications over the Web.

DIFFERENT VERSIONS

Included in the Enterprise Edition is Microsoft SourceSafe (for project code management), a five-client license of Developer, editions of the SQL and Transaction Servers, a new RDO engine for remote data access, and special tools for managing SQL queries. A visual query designer allows you to make stored SQL procedures

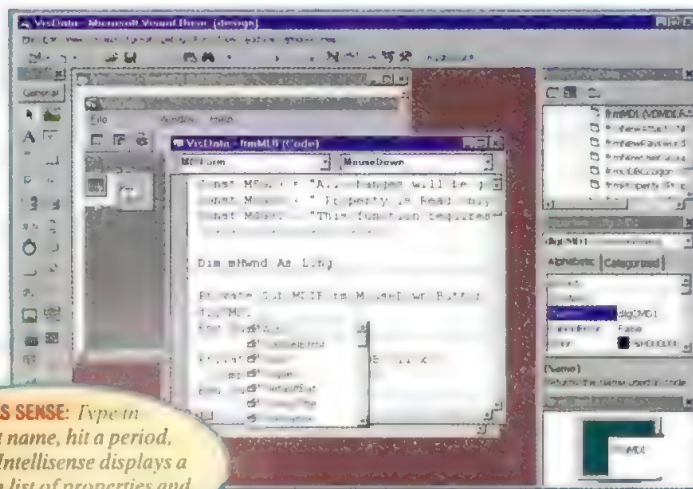
and treat them inside VB as if they were standard VB procedures. A Transact SQL Debugger lets you debug these and other stored procedures written to SQL Server.

There have been reports of problems with VB 4.0 applications once VB 5.0 applications have been installed. Microsoft claims that you can fix these problems by using a new version of comctl32.ocx, which is downloadable from Microsoft's Web site (www)

[.microsoft.com/kb/articles/q167/1/21.htm](http://microsoft.com/kb/articles/q167/1/21.htm)).

Any VB programmer will want to upgrade to this new version, and anyone looking for a powerful but easy-to-use programming environment should place Visual Basic 5.0 at the top of the list.

Visual Basic 5.0. List price: Learning Edition, \$99 (competitive upgrade, \$49); Professional Edition, \$499 (competitive upgrade, \$199); Enterprise Edition, \$1,199 (competitive upgrade, \$699). Requires: Windows 95 or Windows NT 3.51 or higher; 8-32MB RAM (depending on edition and platform); 25-345MB hard disk space (depending on edition); CD-ROM drive. Microsoft Corp., Redmond, WA; 800-621-7930, 206-882-8080; www.microsoft.com/vbasic. *Circle 404 on reader service card.*



MAKES SENSE: Type in an object name, hit a period, and VB's Intellisense displays a drop-down list of properties and methods that can come next.

size; it
lets you
in place.

INTELLISENSE

The most spectacular set of new features in VB 5.0 is what Microsoft calls Intellisense. Just as VB 1.0 redefined the Windows programming paradigm so much that it's difficult to imagine a development platform without an event-driven graphical design mode, the VB 5.0 approach to writing code is likely to redefine what we expect in a programming environment.

Our favorite Intellisense feature involves programming objects. Type in the name of a built-in object (such as a control on a form) or a variable declared as an object (for example, "Dim foo As Form"), hit the period, and suddenly a drop-down list of properties and methods

lists directly query the objects to find allowed values, so they don't rely on a fallible documentation writer.

OTHER GOODIES

For the first time with VB, you can tell the program to compile to native code rather than to the threaded p-code as in earlier versions. Traditionally, Microsoft has said that the lack of true compilation in VB wasn't that significant. But now that true compilation has been added to VB 5.0, Microsoft claims that some calculation-intensive code will run 10 to 20 times as fast. This does not eliminate the runtime module.

Besides the traditional setup .exe, the setup toolkit lets you make a Web page that automates the download of necessary ActiveX controls. For Web use, there are wizards to pro-

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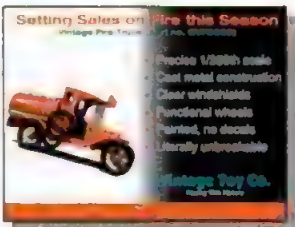
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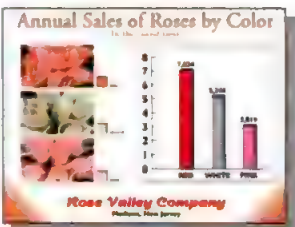
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First Looks

MONITORS

Pure Viewing Satisfaction

Hitachi/NSA hits a home run with its new 19-inch SuperScan Elite 751.—By Steve Buehler

If your heart wants a 21-inch monitor but your wallet can handle only a 17-inch tube, Hitachi/NSA has a pleasant surprise for you. The new Hitachi/NSA SuperScan Elite 751 (\$1,149 suggested retail price) is a high-quality 19-inch monitor with outstanding visual capabilities that's a serious contender for power desktops.

Although many users might like a 21-inch monitor, the cost (typically upwards of \$2,000) and the size (about 21 inches both high and wide, 24 inches deep, and 75 pounds) have proved to be deterrents. Affordable 17-inch monitors from \$600 to \$1,000 have been the only options for budget-conscious CAD, DTP, and power desktop users who need more space. Graphics cards have improved, but the futility of trying to distinguish tiny icons and images has kept users from exploiting the higher resolutions supported by their hardware. Hitachi developed the Elite 751 to fill this need, and it does so very well.

On subjective tests, the moni-

tor's new "A-EA-MDF" electron gun and 0.22-mm dot pitch enabled it to present crisp and clear test screens, even at small point sizes. Pincushioning scores



GORGEOUS VIEW: The new 19-inch SuperScan Elite 751 is a worthy competitor for your big-screen dollars.

were extremely good, and line diagrams appeared to pop off the screen, an observation supported by the good misconvergence and luminance scores. Users who spend a lot of time doing color processing should be pleased with the Elite 751's color handling, which shifted to the warm spectrum for most hues. In addition, the flat-square tube had excellent geometric measurements.

With the Elite 751's maximum

resolution of 1,600 by 1,200 at 75-Hz refresh and 1,024 by 768 at a surprising 115-Hz refresh, even the most flicker-sensitive users should be able to enjoy it. The Invar shadow mask and antiglare coating help keep down ambient interference, and with this monitor's excellent luminance, most images are so clear that even mild reflections from background light prove insignificant.

The Elite 751 has a comprehensive on-screen display that includes support for instructions in five languages. The adjustment buttons, however, are a bit too close to the screen bezel for users with large hands.

Hitachi has assembled all these features into a package that's easy on your desktop space. The monitor is only about an inch bigger in all external dimensions than a typical 17-inch monitor, so putting it on your desk won't overwhelm you. It's

also an impressive 3 inches shorter and narrower than a typical 21-inch tube, and more importantly, it's 4 inches less deep. In addition, at 50 pounds, it's only slightly heavier than a 17-incher and 20 pounds lighter than a 21-inch monitor.

TEST RESULTS

We used ZD Labs' MicroVision SuperSpot 200 (a special hardware device containing testing

software) to compare the Elite 751 with 21-inch and 17-inch monitors that we recently reviewed (for more information, see our issues of June 24, 1997, and October 8, 1996, respectively). In our MonMark measurement, which reflects overall performance, the Elite 751 easily outscored the average monitor from both roundups.

The Average MTF (modulation transfer function) score showed the sharpness of the Elite 751's flat screen and new electron gun design: This tube clearly outclassed all recently tested monitors except for the ViewSonic PT813, the recent 21-inch Editors' Choice winner. Hitachi's new monitor also had a good Misconvergence score, although not quite as good as that of the latest 17-inch Editors' Choice, the Samsung SyncMaster 17 GLi.

It's a fact that 21-inch monitors have dropped in price, but the entry fee is still about \$2,000. With the best 17-inch monitors still in the \$750-to-\$1,100 range, Hitachi's new 19-inch model is a worthy competitor for your big-screen dollars. If you've yearned to keep several windows open on-screen at usable sizes, you'll find this monitor a welcome sight.

Hitachi/NSA SuperScan Elite 751. Suggested retail price: \$1,149. Nissei Sangyo America Ltd., a Hitachi Company, Westwood, MA; 800-441-4832, 617-461-8300; www.nsa-hitachi.com. Circle 405 on reader service card.

PERFORMANCE TESTS

Monitors



The 19-inch Hitachi/NSA SuperScan Elite 751 was a spectacular performer on our monitor tests. Its MonMark score—derived from eight individual objective tests based on screen attributes most important to business users—was higher than the average scores among

17-inch and 21-inch monitors in two previous roundups. It also scored higher on the Average MTF (modular transfer function) test, indicating a sharper picture quality. The Elite 751's score on the Vertical Pincushioning test was slightly surpassed by the average 17-inch monitor score.

	MonMark ▲	Average MTF (percent) ▲	Misconvergence (mm) ▼	Horizontal Pincushioning (mm) ▼	Vertical Pincushioning (mm) ▼	Luminance (foot lamberts) ▲
Hitachi/NSA SuperScan Elite 751	183	70	0.10	0.24	0.61	33
Average 17-inch monitor (PC Magazine, 10/8/96)	166	60	0.11	0.43	0.38	32
Average 21-inch monitor (PC Magazine, 6/24/97)	160	58	0.13	0.54	0.63	29



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First Looks

GRAPHICS SOFTWARE

Artists' Embellishment

New features highlight Embellish, a hybrid graphics package for OS/2 and Windows.—By Esther Schindler

Some people are born with artistic skill; the rest of us depend on affordable software to help us manage graphics. Embellish 2.01 (\$69). Dadaware's new graphics application for OS/2 and Windows 95, has enough features to instill self-confidence in those intimidated by crayon-wielding six-year-olds. Its designers haven't achieved all of their goals, but they've tried hard to do so.

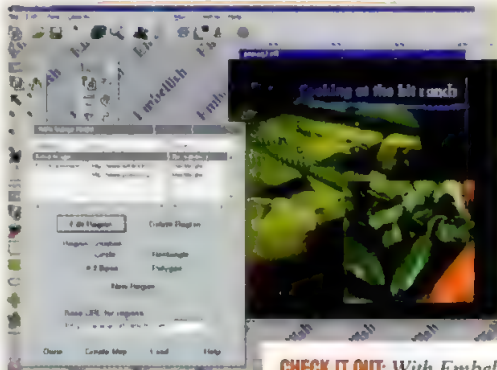
Embellish includes all the tools for bitmap management and basic graphics manipulation that you have come to expect, including free-hand and "magic" selection tools, special effects, and object masks. Standard features include contrast and transparency controls and cloning tools.

You can work with any number of images concurrently, using palettes and menu options to manipulate and enhance them. You can merge objects on a canvas into the base image, or you can lay them atop one another just as you would apply paint or effects to layers of transparent film.

Embellish contains 22 special effects, 16 draw/paint tools, and 14 paintable effects. You can use text with graphic effects, though you cannot wrap text around a curve.

With several impressive tools, Embellish gives a special twist to old favorites. For example, you can paint with colors or graphic effects. Chalk has a completely different texture than the commonplace airbrush or pencil, and you can adjust its strength, quality, and diameter. You also can insert pieces of an

image into Embellish's rubber-stamp tool and "stamp" the image using varying intensities. And the oil paint effect is nothing short of splendid, though



CHECK IT OUT: With Embellish, you can use menu and graphical palettes to create and modify objects. The viewer can serve as a previewer, as shown here.

perhaps you'll prefer the fish-eye, cone, or slice effects.

You're likely to use Embellish to create Web graphics, and it provides reasonable Internet functionality. You can convert graphics to transparent or interlaced GIF and JPEG files. Embellish can create Web maps complete with URL links, and it generates the appropriate HTML code.

But feature enumerations go just so far. Embellish is most special in how far it bends over backwards to offer extra functionality. For instance, most graphics applications support RGB, HSV, and CMYK, but this one also lets you manage color channels using LUV, a television standard.

Some of the tools have fine-tune control. When you

emboss an object, you can specify the elevation and angle of the light and the treatment of corners. And a one-button contrast feature called Auto Enhance adjusts photos, so you don't have to fiddle with getting the settings just so.

Embellish is also full of small but impressive extra features. Bubble help is common nowadays—if you leave the mouse on an icon for a few seconds, you'll see a short description of its function in a bubble—but Embellish takes this idea a step further. Leave the mouse on an icon for a bit longer and a large bubble provides a paragraph with more detail.

This feature will keep you from using the online help files (which are adequate) as often as you might otherwise.

We tested the OS/2 version; the CD-ROM includes both that and the Windows 95 version. Embellish's integration with the OS/2 shell is good, though not outstanding. But the product's designers have made a real effort to take advantage of multi-

are practically transparent. Embellish includes only limited screen capture functionality, and it can produce only basic slide shows. The File/Open dialog has no preview capability, and even though Embellish can create a catalog of images in a background process, once you have the catalog you can't do much with it. The program hasn't fully implemented scanning support yet (though that's expected soon), and it has only one level of undo. Worse, Embellish is not especially stable; we learned to save our work often.

Embellish has a host of exciting features, but all too often accomplishing tasks involved a frustrating variety of actions. If you paint a box, you can apply emboss, gradient, or colors (among other features), but to adjust contrast or apply special effects, you have to select a box. Creating a rubber stamp requires selection with yet another pointer.

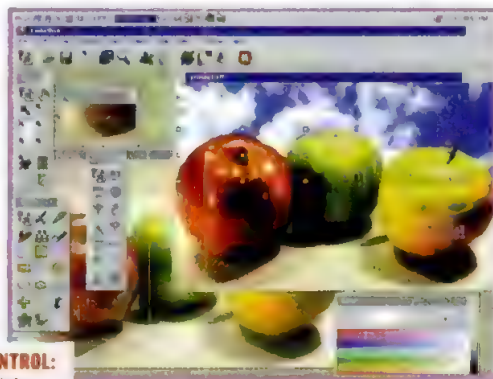
Even after we read the included manual twice, the language was still a little difficult to comprehend. With a few weeks' experience, you'll forget Embellish's awkward learning curve, but do give yourself a little time to get started.

We don't recommend using Embellish as your only graphics application. Where it's good, it's

very good, but its feature holes are empty indeed. Do include this program in your graphical bag of tricks. It is such a considerate application, in terms of the many features it implements well, that you'll want to keep it handy.

Embellish 2.01. List price: \$69. Requires: 8MB RAM, 5MB

hard disk space, OS/2 2.0 or higher or Windows 95. Dadaware Inc., Goleta, CA; 805-961-4987; fax, 805-961-4409; www.dadaware.com. Circle 403 on reader service card.



TAKE CONTROL: Embellish incorporates Web image maps into its tools for manipulating graphics.

tasking. For example, if you lose patience during time-consuming operations such as oil painting, you can adjust the running process's priority.

Where features are thin, they

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COMPAQ

First Looks

PRINTERS

Wide-Body Ink Jets

New Epson and HP large-format ink jet printers produce terrific output at great prices.—By Bruce Brown

When legal-size paper just isn't big enough for your printing needs, wide-carriage printers are mighty appealing. Until last year's entry of the 11- by 17-inch format Canon BJC-4550 (\$499 list), the other options for high-quality, large-format printing were very costly. Two new wide-carriage, four-color printers from Epson America and Hewlett-Packard Co. now offer stiff competition for the BJC-4550.

The Epson Stylus Color 1520 (\$800 street) prints on paper ranging from 4 by 4 to 17 by 22 inches at up to 1,440- by 720-dpi resolution. The HP DeskJet 1000Cse, on the other hand, produces output sizes ranging from 4 by 6 to 11 by 17 inches at 600-dpi resolution and is targeted to sell for an aggressive \$500 (street).

Although these printers do not produce the drop-dead quality photo output of the photocentric Epson Stylus Photo and HP PhotoSmart Photo Printer, their versatile output size, print speed, and print quality make them good choices for anyone who wants an all-purpose printer.

EPSON STYLUS COLOR 1520

The Epson Stylus Color 1520 uses Epson's Micro Piezo print technology with QuickDry inks

to produce stunning output with relative speed. Though it costs more than the DeskJet 1000Cse, the output and performance are well worth the money.

The Epson printer has parallel and Mac serial ports for simultaneous connections. The paper tray holds up to 100 sheets, with a continuous-form standard tractor feed on the printer's lower rear. Color- and black-ink cartridges cost approximately \$27 each, with letter-size printing costs rated at 2 cents per page for 5 percent black coverage and 9 cents per page for 15 percent color.

Rated at 6 ppm for text printing and 5 ppm for color, the Stylus Color 1520 was the faster of the two printers on a variety of printing tasks. High-quality photo printing on glossy photo paper at maximum resolution took just a bit longer with the Epson, but its output was noticeably finer. Gray-scale print samples on high-resolution paper also had finer detail. Default-mode black-text printing

FIT FOR A CLOWN:

From left, HP output samples on plain, photo, and HP's bright white paper.



was excellent on both, with the Epson yielding a slight edge to the HP on this task.

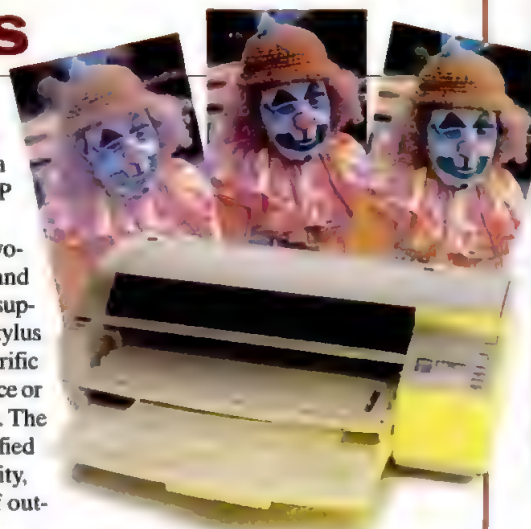
Backed by a two-year warranty and toll-free technical support, the Epson Stylus Color 1520 is terrific for all-purpose office or home applications. The higher price is justified by the speed, quality, and wide range of output sizes.

Epson Stylus Color 1520. Street price: \$800. Epson America Inc., Torrance, CA; 800-463-7766, 310-782-0770; www.epson.com. Circle 401 on reader service card.

HP DESKJET 1000CSE

Hewlett-Packard's DeskJet 1000Cse costs about \$300 less than the Epson, making it the better choice for the budget-constrained buyer. A rugged device packed with special printing features, the HP DeskJet

CLOWNING AROUND: From left, Epson output samples on plain, 720-dpi, and glossy paper.



1000Cse is a true bargain.

The DeskJet 1000C printer has a parallel port and a 150-sheet input tray. The largest print area is 11 by 17 inches (full-bleed printing is possible if you're using 13- by 19-inch oversized media). Text printing is rated at 4 cents per page, with color printing rated at 8 cents per page. Black ink cartridges cost \$32, while color units cost \$35.

The HP is rated at 6 ppm for black text and 3.5 ppm for color printing. Text output was a bit tighter than the Epson—both printers rival laser printers when used in standard print mode on high-resolution ink jet paper.

The HP is loaded with features, including billboard printing, banner and booklet printing, and automatic image scaling to fit the current paper size.

You can also print two, four, or eight images on a page.

The DeskJet 1000Cse is backed by a standard one-year warranty, with toll-call technical support six days a week and an optional three-year Express Exchange service plan.

HP DeskJet 1000Cse. Street price: \$500. Hewlett-Packard Co., Palo Alto, CA; 800-752-0900, 208-323-2551; www.hp.com. Circle 402 on reader service card.

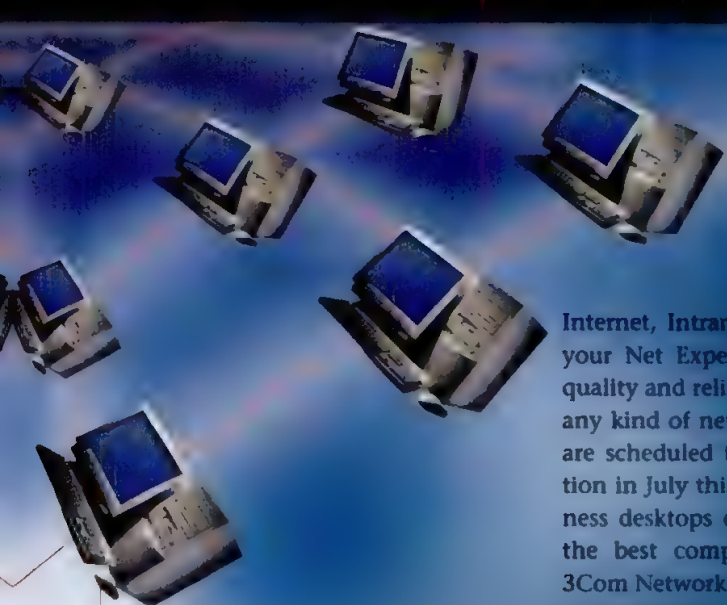
PERFORMANCE TESTS

Large-Format Ink Jet Printers



The Epson Stylus Color 1520 was the speedier printer of the two on our performance tests. Considering its steeper price tag, we expected this. On our full-page color photo print job, however, the HP DeskJet 1000Cse beat the Stylus by a nose. For the text and newsletter tests we used plain paper and each printer's default mode. For the photo test we used glossy photo paper and the highest available resolution.

Minutes seconds	5-Page Text Document	Full-Page Newsletter, Monochrome	Full-Page Newsletter, Color	Full-Page Photo, Color
Epson Stylus Color 1520	1:40	0:53	0:54	5:53
HP DeskJet 1000Cse	2:20	1:05	1:44	5:46
	◀ BETTER	◀ BETTER	◀ BETTER	◀ BETTER



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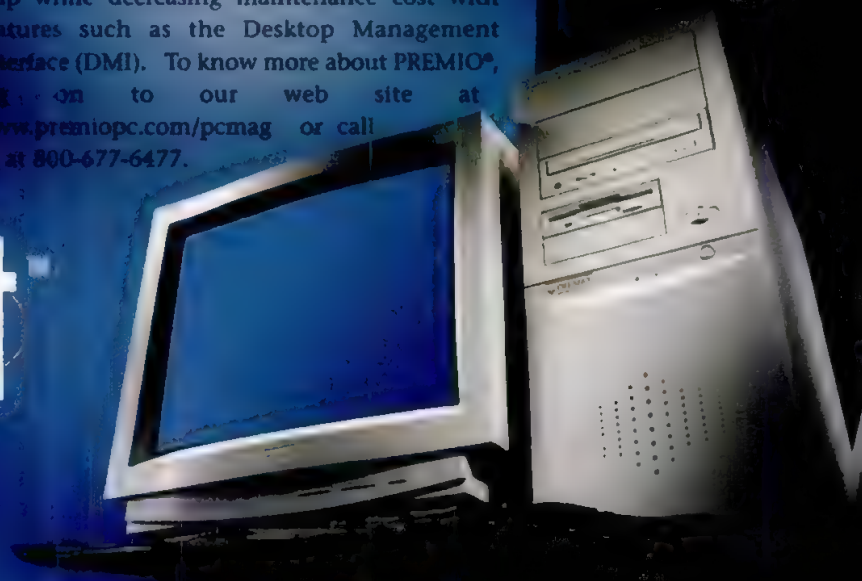
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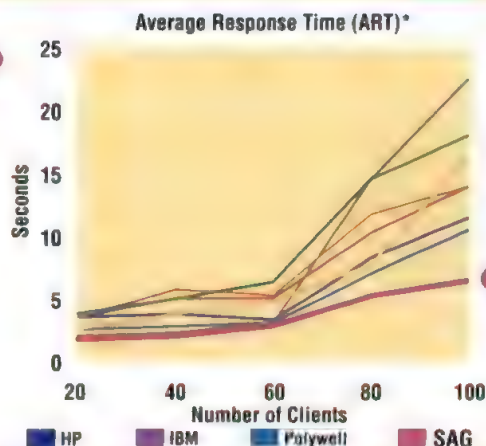
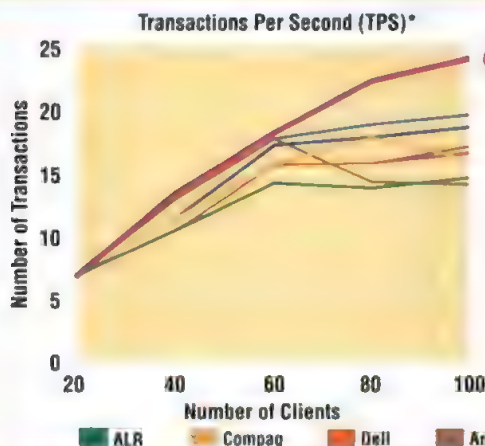
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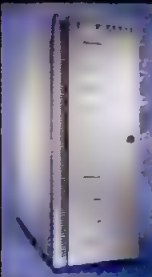
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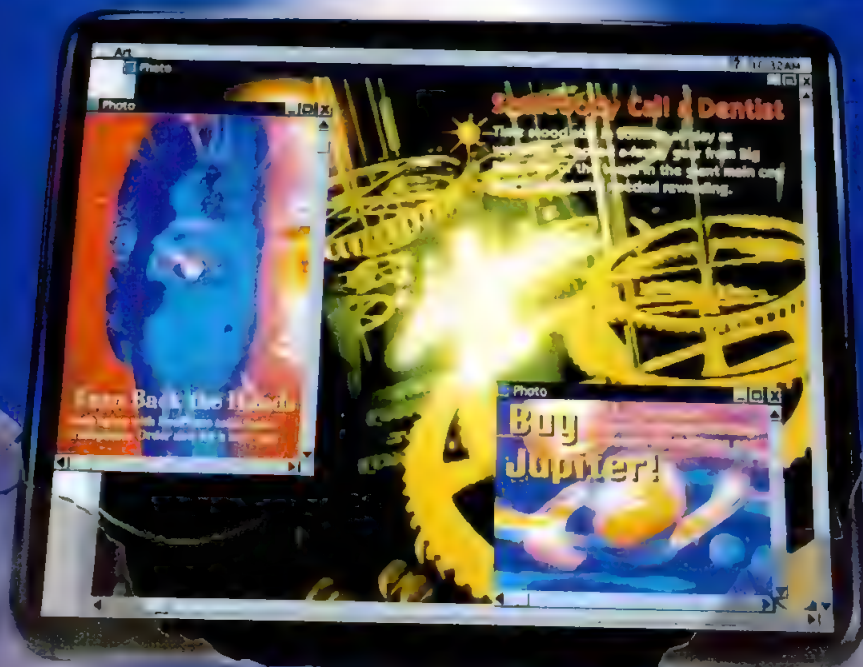
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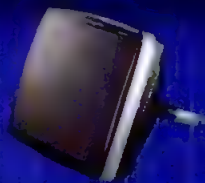
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Second Looks

WEB UTILITIES

No More Stale Pages

Peak Technologies' \$29.95 PeakJet 1.51, formerly known as Net.Jet 1.11, is a 32-bit Java-based utility that replaces your browser's cache. When we first reviewed this product (First Looks, March 25, 1997), we liked how it sped up Web page access, but we were concerned that it would interfere with your ability to get the most up-to-date page information. While you're surfing and reading, the software goes out and caches links it presumes you're likely to click on next. Unfortunately, there can be an hours-long delay between the time a page is cached and when you actually view it.

PeakJet 1.51 fixes this problem in two ways. When you first start the program it automatically marks every page in the cache as old, so when you click on a link (unless it has been updated) you'll receive the live Web page. Although this means you'll have to wait as you normally would for the page to download, you'll be assured of getting the most recent information.

A new option, Toggle Cache, lets you disable the PeakJet cache so that every page you load will be live. Previously, you were unable to turn the program off if you wanted to browse on your own, a significant problem for anyone who visited frequently updated sites.

As you browse the Web, you should notice a dramatic improvement in speed over previous versions. PeakJet now has a new, simpler-to-use interface and added support for the Java Virtual Machine (JVM). According to Peak Technologies, the JVM updates pages more frequently and lets

you browse up to three times faster; to some extent, this solves the problem of stale pages.

Several advanced cache configuration options are also added. Most important of all, you can now use PeakJet as an off-line browser via the advanced cache options. If you're worried about space, you can relocate the cache file to a separate hard

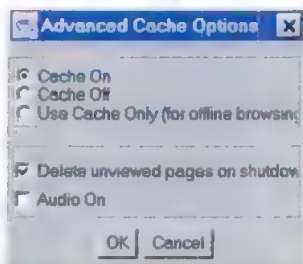
disk or storage device and set the program to stay within a specific URL.

When you're browsing, you need all the speed and help you can get. With PeakJet 1.51, you're guaranteed a better, more accelerated session.

To obtain a free 30-day trial version, download a copy of the program from Peak Technologies' Web site (www.peak-media.com).

You'll always have the latest version of the software, because PeakJet always checks for the latest version of itself.

—Karen J. Bannan



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SCANNERS

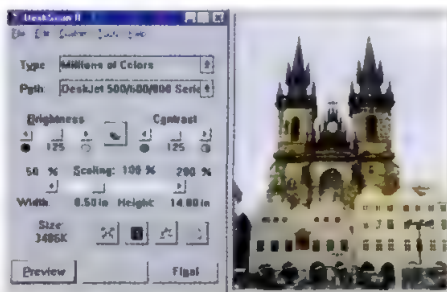
HP Is Win NT-Friendly

Hewlett-Packard Co. has released its long-awaited software driver and scanning utility for Microsoft Windows NT 4.0. Backward-compatible, the software works with HP ScanJet IIc, IIp, IIcx, 3p, 3c, 4p, 4c, and 5p scanners. The self-extracting 3.5MB ZIP file (sj211en.exe) can be downloaded directly from Hewlett-

spending folder will be automatically added to your Start menu. There are five files in all, including DeskScan II scanning software, the ScanJet Copy utility, Scanner Test, READ.ME, and Uninstall.

Upon opening DeskScan II for the first time, you'll be prompted through an introductory tutorial for new users. The clean interface, which will be familiar to Microsoft Windows 95 DeskScan users, offers a range of scanning controls. You can select from 11 image types and 12 destination paths (including screen, fax, and HP LaserJet and DeskJet

printers). You can also zoom into an image, do a preview scan, and adjust brightness, contrast, and scaling. A free floating box provides image information. —Melissa J. Perenson



Packard's Web site at www.hp.com/cposupport/scanners/software/sj211en.exe.html.

After running setup, you'll install the utility into the DeskScan folder, and a corre-

UTILITIES

A Clean Sweep

Even though we liked Quarterdeck Corp.'s CleanSweep 3.0 (The 1997 Utility Guide, April 8, 1997), we thought the program might be a little overzealous for novice users. Quarterdeck Corp. has since added a patch that will prevent you from accidentally deleting important files or drivers. You can download the patch from Quarterdeck's Web site at www.quarterdeck.com.

The patch updates the help file, most notably by adding new documentation to the SafetySweep section of the file. SafetySweep is designed to protect against accidental file deletion automatically, but some of the documentation that accompanied Version 3.0 could have caused you to delete files unnecessarily.

Another major component of the patch fixes a compatibility problem with Microsoft Office 97. Previously, users of CleanSweep experienced what appeared to be a system hang-up whenever Office 97 was running. Now, you can run both programs at the same time without worry. Windows NT users will also notice an improvement in CleanSweep's interface.

Finally, the program's Update-It functionality has been enhanced. Now, whenever you use the program, it will check to see if you are using the latest version available. If not, CleanSweep will download any patches or updates for you. You can manually update the patch from the Quarterdeck Web site. —KJB

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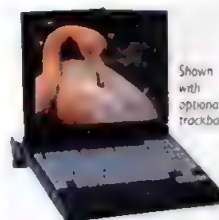
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Finally: Accessibility for Windows

As computers have gotten more sophisticated, people with disabilities have been on a technological seesaw. New accessibility and enabling products are offset by increasingly complex operating systems and applications. The graphical user interface

in general, and Microsoft Windows in particular, was the single worst thing to happen to handicapped users. Back in the days of DOS, a simple program could read the ASCII characters right out of screen memory and into a braille machine or a speech synthesizer. Bitmapped graphics demolished that little hack. ASCII text has been all but obliterated by pointers, attributes, and complex file structures.

I've been talking to Microsoft product managers for years about better ways to expose the underlying ASCII text to provide greater accessibility to their operating systems and applications. Here at *PC Magazine*, we've also had an ongoing interest in making the machine easier to use for a wide variety of people. One of the first tech tips I ever edited for the magazine (back in 1983) was from a disabled user who had contrived a couple of tiny bags of lead shot that he kept on his keyboard. When he needed to use the Ctrl and Alt keys, he rolled the shot bag onto the appropriate key with his mouthstick, then pressed the letter key. Then he'd roll the shot bag to the side again. We responded by writing a simple utility program that would "lock" the Ctrl or Alt key until the next key was pressed. It was among the first accessibility programs for the IBM PC, and it was widely distributed, copied, and enhanced. It took Microsoft more than a decade to include the feature in the operating system.

Microsoft has made up for lost time with the advent of Active Accessibility (MSAA). The technologies available today for enhanced access, including speech recognition, speech synthesis, screen magnification, and alternate input devices are so complex that they need application programming interfaces of their own. MSAA addresses the needs of users and devices alike with new code and a full-accessibility API. MSAA will become a full-fledged part of Memphis and Windows NT 5.0. Some parts of MSAA are already in Windows 95, but the bulk of the API is still in the works.

You can download the SDK and examine the functions within MSAA from Microsoft's Web site, www.microsoft.com/enable. Microsoft's sample screen magnifier is a good

illustration of how MSAA works cooperatively with applications. It offers 2X to 12X magnification and works much like other screen magnifiers. When MSAA is activated, the magnifier tracks with the mouse and the cursor keys, always staying focused on the area of interest on the screen. Interaction at this level has not been possible previously without some fairly serious hacks that caused compatibility problems.

Luanne LaLonde, accessibility product manager for Microsoft, says that these "smart" enhancements are the future, and that Microsoft is doing everything in its power to encourage widespread adoption of the new APIs. In order to get the coveted Windows logo seal, software vendors will be required to integrate MSAA into their applications. LaLonde says that adopting the APIs is far from trivial; MSAA operates at the WinEvents level and with OLE objects. For a mainstream application, she anticipates that it could take a couple of months of developer time. Developers have to go back to their user interface code and expose the content so that MSAA can hand it off to any other application or device that needs it. LaLonde says that there's also a hidden benefit in that you can use the MSAA hooks for deep, detailed testing and program automation.

Does all this seem a trifle draconian? If you're a software vendor, remember that it's for your own good. It goes beyond the simple humanitarian concern for people who may want to use your product but can't. If you want to sell to the government, you've got to have accessibility provisions. Educational institutions and just about all companies with purchasing policies have disability requirements, too.

Other aspects of MSAA deal with how accessible your program is to Java. You can get a full appreciation for the extent of the logo requirements at www.microsoft.com/windows/thirdparty. Although there's no requirement for internal developers working on proprietary apps to comply, they'd be well advised to do so. Your in-house code should function at the same level as commercial packages. Accessibility is hard work, but ultimately it's a win for everyone. □



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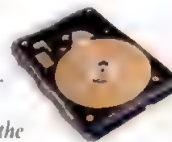
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Best Way or the Highway

A recent discussion with Microsoft executives about usability issues with Microsoft Outlook—a product people either love or hate—brought to mind competing trends in user-interface theory. The wrong theories are winning.

What I'm talking about specifically has to do with control. How do you make a program do something? In the broadest sense there are three ways in which the computer industry deals with control.

1. Programmer's prerogative. The programmers do what they feel like doing. For example, this is how a slash key was chosen as a control: The designer of VisiCalc, Dan Bricklin, has bent pinkie fingers and it was the most convenient key to tap effortlessly—for him! This was incorporated in VisiCalc and blindly copied by Lotus and others. Fortunately, this kind of thinking is going by the wayside as focus groups and usability experts take away these options.

2. Rigid systemwide structure. This is the model that the Apple Macintosh originally followed. The OS was designed so that all software had to work a prescribed way. The reference books regarding this were huge. All software that ran on the Mac had an exact look and feel. A person could go from program to program and sense how to run each one without any retraining. Observers referred to the Mac as having a Nazi-like operating system, as its rules dominated. This gradually deteriorated with the invention of Hypercard and the introduction of complex programs such as Adobe Photoshop. Microsoft also insisted on more versatility, and the rigid controls were shaken from their foundation. Apple lost control of its control.

3. The multiplicity system. This is an all-purpose please-everyone approach, in which there are a number of ways to do one chore. Each way satisfies some user who did it that way—in the sixties. IBM, best known for this approach, does everything it can never to let an interface convention die; hence, this practice continues.

Then, there's **the best way**. This doesn't exist. No software company has the nerve to try it. And the last time Microsoft put research into an interface it came up with "Bob." I don't expect Microsoft to try this again—but as the market leader, it should.

Exactly why the computer industry cannot admit to itself that there's an absolute best way to do something is be-

yond me. I'm sure that numerous readers will write to tell me that there's no such thing. They'll say that it's culture-bound—for example, what an American designs a Chinese person will not comprehend. Others will say that the Mac tried this and failed, although there's no shred of evidence

that anything approaching massive research into human/machine interaction was ever tried at Apple.

There seems to be no interest in developing a "best way" interface. The industry doesn't care. Even with simple hardware, there are still reset buttons in the wrong spot, or on/off switches where children can touch them. I don't even want to go into the ever-changing whereabouts of arrow keys or the stupidity of the Caps Lock location. To expect software companies to do much more than produce garbage code and see if it sticks to the wall seems to be asking too much.

Of course, there would be an endless nerdy debate over details of the "best way." Still, someone has to do something about creeping multiplicity, especially in Microsoft products. This stems from Microsoft's embrace-and-evolve notion of taking ideas others have developed and incorporating them into its own products. Take Outlook, for instance. Microsoft added an idiotic animated helper named Clippy that is supposed to help you with problems. Give Clippy the simple command "Edit fax" and see what wonderful help you get. Clippy is a useless doodad.

Microsoft has usability labs and knows that the best way is possible in an application, but it cannot bring itself to take the next step. Its wizards are superficial jokes, and its user interfaces are a hodgepodge of what everyone else is doing combined with a nightmare of menus.

The worst example of this is its dopey browser interface, which is not much more than two arrows and a stop sign. Microsoft saw a new category of product emerge with this crude interface, immediately adopted it, went nuts over it, and threatened to make it all-purpose. This signaled to me that Microsoft is still not willing to lead us toward a bright future. It can change all that by using its resources seriously to develop a "best way" universal interface.



HELLO...MICROSOFT?

There seems to be no interest in creating a "best way" interface. The industry doesn't care.

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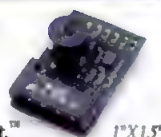
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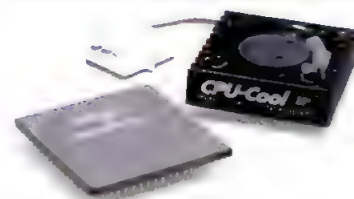
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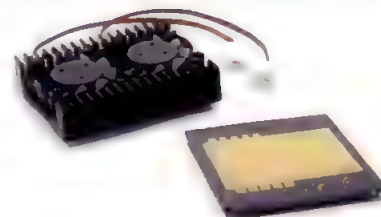
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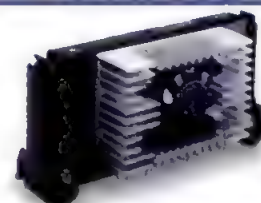
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Inside Track

Memory chip makers are **up in arms** about recent deals between Rambus and Intel, claiming that Intel is making another run at **cornering the memory market**, as it had attempted in late 1995.

What's happening is that Intel is **locking vendors out** of the specification development in such a way that it can bring high-performance Rambus-based systems on the market before its competitors get hold of the specifications. Rambus is essentially command-driven smart memory that coordinates with the CPU more cooperatively than old-fashioned "dumb" memory. It's argued that this type of memory design is necessary in **high-speed** machines.

But some see Intel's plan more as a marketing strategy than a technology. It is believed that Intel can synchronize certain microprocessor chip designs with new memory technologies in such a way that by changing certain specifications on the fly, this technology can **ruin the performance** of Cyrix, AMD, and even Motorola-based systems while improving its own. In other words, change parameters and protocols at a critical moment after other processor houses have committed to an earlier design.

Currently **Intel controls** the microprocessor market, the support chip set market, and the motherboard market. It now sees the memory market as another one in which it should profit. But Intel has no reason to go into manufacturing memory if it can just get **a piece** of the memory makers' pie. It will simply charge a royalty to memory makers to use the Rambus technology. And that royalty may be as high as 6 percent of sales—a healthy chunk. Furthermore, it's **rumored** that just to get into the Rambus bed, a memory maker might have to put up a \$3 million to \$6 million "tribute."

This whole deal essentially takes much of the profit and gives it to Intel/Rambus. Intel likes the idea of licensing as much of the computer as it can. You have to wonder **what ever happened to "open systems."** The PC is becoming more like a Nintendo. The Slot 1 technology needed for the Pentium II, for example, will also be licensed to **siphon profits** away from motherboard makers that compete with Intel. You can see why the K6 is so appealing to smaller players with its Socket 7 compatibility.

This Rambus situation is the worst, though, according to sources inside the memory business. To counter this threat, an ad hoc specification for a Rambus-like architecture is being developed in a hurry. This is called **Synolink DRAM (SLDRAM)**, and information can be found at www.scizzl.com. This site opened originally to promote what is called the "The Scalable Coherent Interface (Local

Recently Compaq attempted to buy Gateway 2000, offering as much as \$7 billion. Gateway refused the offers.

Now Intel may have an offer on the table to purchase Gateway so that it can have its own branded machine.

Area MultiProcessor). According to the site, this "is effectively a combination computer backplane bus, processor memory bus, I/O bus, high-performance switch, packet switch, ring, mesh, local area network, optical network, parallel bus, serial bus, information sharing and information communication system that provides distributed directory-based cache coherency for a global shared-memory model and uses electrical or fiber optic point-to-point unidirectional cables of various widths." **What a mouthful.** This alone will keep you reading for hours.

The SLDRAM Consortium includes all the **memory makers as well as Apple, IBM, Motorola, and most other semiconductor makers except Intel.** Whether

this crowd can get anywhere remains to be seen. Anyone who watched the VESA-bus folk **get decimated** by Intel's PCI bus will understand Intel's momentum. PCI blew away not only VESA but ISA and EISA, too.

The only reason that **readers should be concerned** about any of this is that heavy licensing and the movement toward a proprietary architecture always means one thing—higher prices.

Personally, I don't understand why the Intel folks don't simply bring out **a proprietary system and get it over with.** And maybe they will—in the form of a **Gateway 2000 buyout!**

Here's the story: **Compaq recently attempted to buy Gateway.** Everyone in the business knows what went down and what's happening. **No matter what they tell you,** the fact is Compaq offered \$5 billion for the company; Gateway refused. Then Compaq offered \$7 billion; Gateway again refused. Compaq felt insulted, looked around, and thought about buying Micron. Now we hear it is **putting together a huge direct-sales operation** and expanding internally, **all at the cost of \$1 billion.** Its **targets** are Gateway and Dell.

There's speculation as to why Gateway wouldn't sell at what everyone thinks was an excellent price. I suspect that **Intel is somehow** in this picture. First of all, Intel has no love for Compaq. Compaq still refuses to use the Intel motherboard and designs. Compaq also was an early investor in NexGen, which designed the K6 and has since been bought by AMD. Intel doesn't like the idea that Compaq is big and powerful, and doesn't want to see it any bigger.

Intel may have sweetened its prices with Gateway to keep the latter from accepting Compaq's offers, or it may actually have an offer on the table to **buy Gateway.** Intel is one beat away from bringing out a branded machine, but it just can't seem to take the last step. Buying Gateway may be that step. The deal may be in the works. □

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Push Back!

Unless you've been living under a rock for the past six or eight months, you've heard about "push" technology and the Web. The idea is simple, if oddly perverse: Instead of you going out and finding things on the Web, content is automatically delivered to

your desktop, in the background, while your Web connection is active. At first blush, this sounds pretty wonderful. No more searching, no more twiddling your thumbs while some huge file comes down the pipe. No more forgetting to check for an update. Stuff just *appears*.

PointCast was first into this game, with its "active screen saver" client last year. You choose the PointCast "channels," or categories of information, that you want, then PointCast automatically pumps you up with the latest in those areas. When your system is idle for a moment, content magically appears on-screen. The latest news, sports, entertainment, technology, and other updates blink by, and when you see something you want to know more about, just click and you're into the whole story.

It was an appealing notion, and PointCast got a lot of attention. MIS managers complained about the amount of bandwidth their users were consuming, especially in cases where users had continuous Web connections available; networks clogged up. PointCast listened and made using the product easier by introducing a proxy server. It even produced a special "insert-your-message-*here*" product to allow companies to add their own internal channels of company news, notes from the boss, and so on. But the rest of PointCast's stuff kept coming down: As an advertising-driven system, it couldn't afford to squelch noncompany voices.

This all sounded great, but in my experience, talking with a large number of PC users and PC managers in corporate settings, PointCast has been a dud. Some companies have dictated that PointCast is unwelcome on their PCs, but the larger issue is users' behavior.

I've been talking about "sticky software" for years. By that, I mean those relatively few programs that really *stick* to our hard disks—the ones we don't install, rave about, gradually cool on, and finally wipe off the disk. From my observations, I think PointCast is becoming the poster child for *nonsticky* software in the nineties.

Certainly PointCast has gotten a lot of downloads and a lot of attention, but far fewer long-term, happy users.

Among the other 40 or so companies developing and delivering push products and content, BackWeb seems best. I've tried a lot of push products, and BackWeb is the only one I keep on the PCs I use. That's not to say BackWeb is going to be an unqualified success. It's full of irri-

tating channels, with little racing cars that shoot across the bottom of your screen, complete with grating noises. It also carries a lot of junk channels—as well as, I hasten to add, solid information from Ziff-Davis, publisher of *PC Magazine*.

So why, if I find almost all of its content irritating or irrelevant, do I keep BackWeb on a couple of my machines? Because I like to see the nice satellite map of the nation's weather that The Weather Channel delivers via BackWeb twice a day. Though I've tried nearly all the other BackWeb channels, none were nearly worth the irritation and intrusions. Though BackWeb seems to have the technology right, the people developing BackWeb content channels have done a much poorer job.

All this is about to be considerably improved—or aggravated, if you prefer—with the arrival and adoption of Microsoft Internet Explorer 4.0 and its Active Desktop.

There are many things to like about IE 4.0—and at least as many to dislike. I hate the idea of a browser metaphor for viewing my hard disk's contents and my files: The browser idea is cool for Web content, lousy for local content. The Ac-

tive Desktop part of IE is somewhere in the middle: a nice idea but one certain to be wildly misused.

Microsoft likes to say that not only will Active Desktop allow you (and push-technology vendors, who are licking their chops in anticipation of IE's wide adoption) to have all sorts of content delivered automatically to your PC and displayed on that browser-facade background, but it will also make *you*—indeed, all of us—push publishers.

Egad. What a nightmare that could be. Sure, you have to take an active enrollment step with any of these push products, in effect asking to receive certain classes of content. But that's an easy trap to fall into, as many early



PUSH BACK!

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JIM SEYMOUR

PointCast users found. And sure, you can drop any of these channels you decide you don't like or need.

In between, we're in for a heck of a ride. Not only will we have large, well-funded, and technically competent companies developing or at least carrying push channels, but now every Joe Pushofsky can crank out the kind of stuff he's sure you and I want to see on our PCs.

Meanwhile, what happens to the original purpose of our PCs? With all this stuff coming down the pipe, with our desktops increasingly full of distractions, do you, like me, ever long for the simplicity of clean DOS-application screens? Are we going to be using our PCs as productivity-enhancing devices, or as oversize Game Boys, electronic *National Enquirers*, and dating services?

Certainly, PCs are just as useful and valid for fun and widening our horizons as they are for cranking out documents, worksheets, and the rest of it. But on our side of that glass tube or LCD screen, we've got to make some decisions about how we want this technology to affect our lives. Even on home PCs, almost always used more for fun than for productive work, push is usually a distraction.

My suggestion: Push *back*. Think about just how much of this stuff you really want and how much is merely a seductive but pernicious distraction. Pass on the irrelevant parts, and by your choices send messages both to push-carrier firms and push-content shops: Enough is enough, damn it.

Finally, despite that screed, I should point out one area where push makes sense: inside corporate intranets. Many push products are adaptable for intranet use, sending out only company-created content. And some newer push products are aimed solely at the exploding intranet market.

I love getting updates alerting me to changes in company health-insurance terms or noting that the company's stock set a new record this afternoon. Push can break through the passivity barrier for intranets; employees have to remember to *look* at what's posted there, and these systems generally lack notification features. Many kinds of company news are better handled through a bottom-of-the-screen streamer than all-hands e-mails.

Push is here to stay, though certainly in a much smaller role than its loudest promoters claim. The burden is on us to separate the wheat from the mountains of pushed chaff. Or risk being buried under piles of pushed nonsense. □

Looking into a Crystal Ball

After crisscrossing the country half a dozen times in the past two months to meet with PC and hardware vendors, I've come back with a notebook full of thoughts about technologies that will be important in the next year, and about who's doing well—and not

so well—in the business. Here are some highlights.

Thank you, AMD and Cyrix, for the K6 and 6x86MX. PC vendors that have been force-fed Intel's CPU delivery and price schedules the past several years say Intel reps are much more human these months with even this modest amount of competition in sight.

"Customer for life" is becoming an oft-repeated buzz phrase. That means you not just sell the buyer on this year's PC or printer but make the person more inclined to stick with you in the future through first-class product and support. That's one reason PC vendors are looking at ways to sell direct: Retailers aren't too concerned about whether you're bonding for life with one vendor; they just want to make the sale.

1997 is the second straight year in which the PC you really want will come out in the first quarter of the next year: It's the double whammy of the Pentium II (here now but not yet cheap) and its second-generation LX chip set (due early fall), and the Windows 97-now-98 operating system (Memphis) that turns on the PC's cool features, particularly the fast AGP graphics bus and universal support for the Universal Serial Bus.

USB vendors will be shooting themselves in the foot if they overprice their first products. Nortel is pegging a very nice two-line USB home/SOHO phone at \$300 plus, versus about \$200 for an similar existing model.

Of the top PC vendors, IBM appears to have the clearest vision of home computing in the future: multiple home PCs, home control and automation, idiot-proof home networking—even information appliances.

Watch Sony, which was first out with 5-pound CD-equipped subnotebooks. Not bad for a first offering. And the second generation of the desktop Sony PC begins to flesh out the VAIO (Video Audio Integrated Operation) promise made at last fall's launch.

There are too many vendors of digital still cameras, about two dozen in all. Watch for a falloff in the next six months. Look for quick direct printing from digital camera to ink jet printer within the next year. And you might expect

print quality to catch up to traditional film in two to three years for consumer snapshots (meaning 4-by-6 prints).

Expect to see nearly waterproof ink jet printing by year's end. But don't expect significant reductions in the cost of color ink jet printing.

"Pro-sumer"-quality PC-based video editing will catch fire in the next year as the technology pieces fall into place: IEEE 1394 (FireWire) adapters to catch video streams from digital video (not still) cameras, affordable big hard disks (9GB), and TV video-out jacks on graphics adapters.

PC-based TV tuners provide so-so quality today; they could match regular TVs in 1998. If you want to kick the TV video quality of your Gateway Destination or similar system into high gear, feed it exclusively digital signals: DVD today, DSS in the near future. DSS, of course, is a digital MPEG-2 signal, but DSS receivers now prematurely convert it to an analog signal. You want the signal to stay digital all the way to the monitor.

DVD players should catch on a bit more quickly as consumer appliances (for your TV set) than as replacements for CD-ROM drives in PCs. DVD image quality on your TV is breathtaking.

The notebook industry needs to get its act together on repairs. Given the chance to hold back scarce parts for anticipated warranty work, vendors instead use them to build more notebooks. Toshiba has had problems in this area, while Compaq has had bad luck with re-

liability on several recent portables.

The big desktop PC vendor with the most market share worries has to be Packard Bell. PB is a retail-only, first-timer-only machine in the minds of many users. That's not where the market is headed. Packard Bell has been promising to fix its below-average service and support for years. One saving grace: Despite competition, Packard Bell often remains the cheapest PC you can buy at retail.

Intel's MMO is a mixed blessing. This mobile Pentium MMX CPU makes it easier for more vendors to get new portables to market quickly. But the size makes it tough to build subnotebooks thinner than 1.5 inches. □



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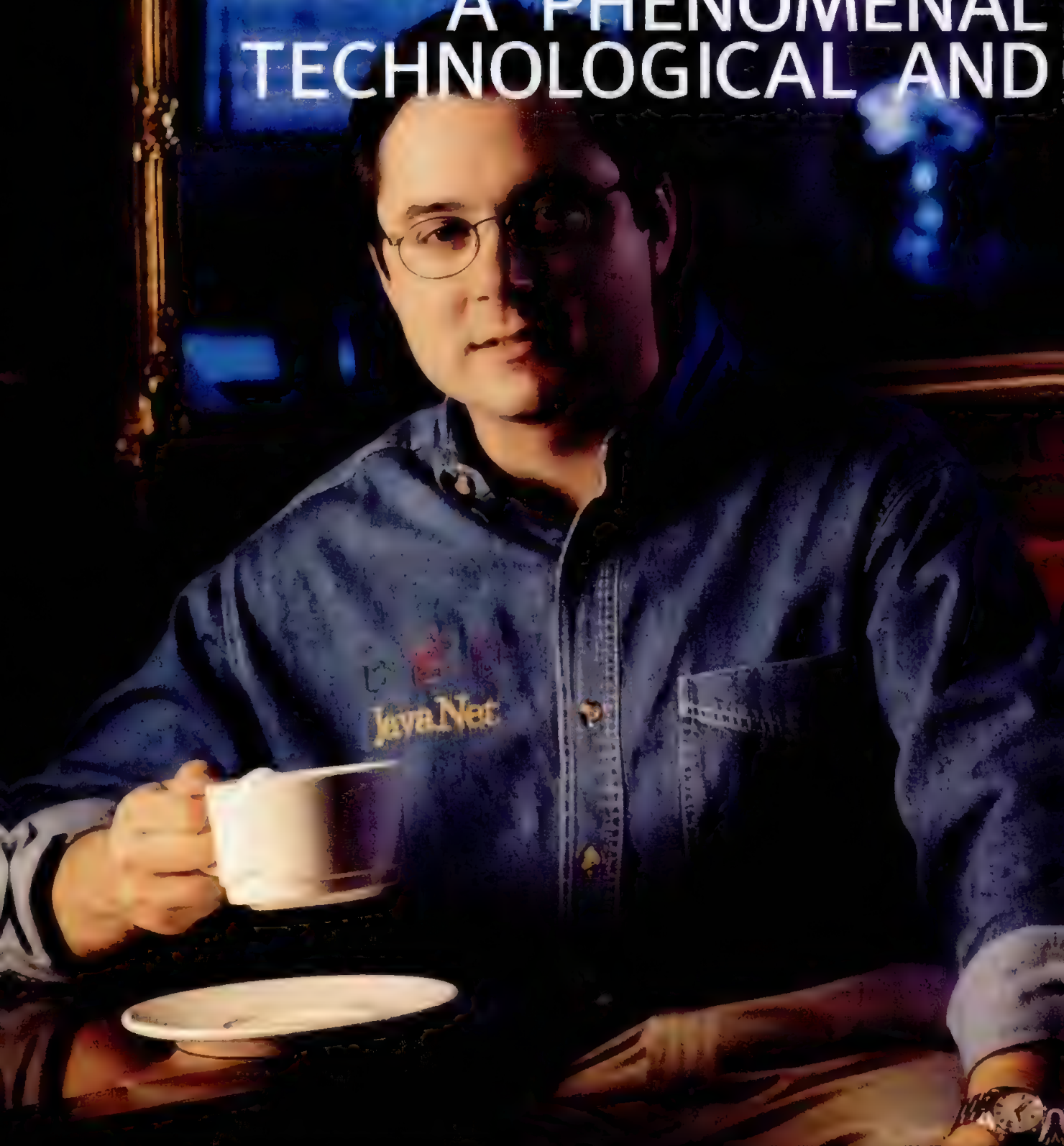


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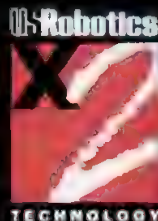
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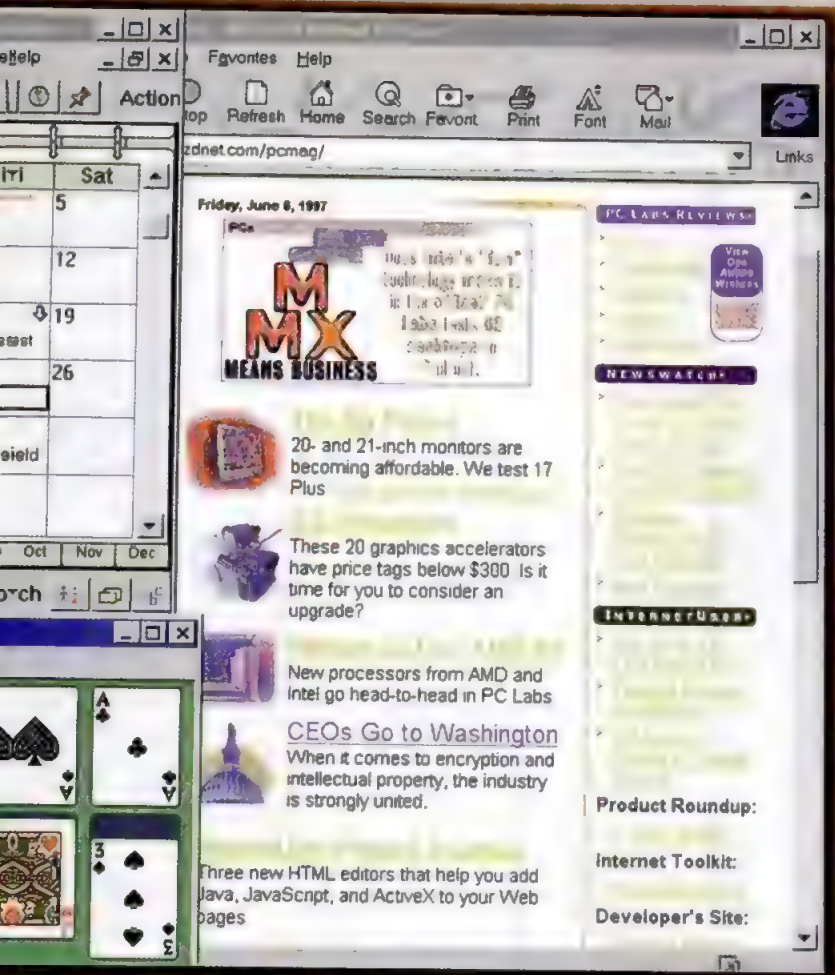
*Maximum download speeds with x2 are limited to 53 Kbps. Actual speeds may vary. Uploads travel at speeds up to 28.8 Kbps. Requires x2-capable modem, x2-compatible analog phone line and x2-capable service provider. See www.usr.com/x2 for details.

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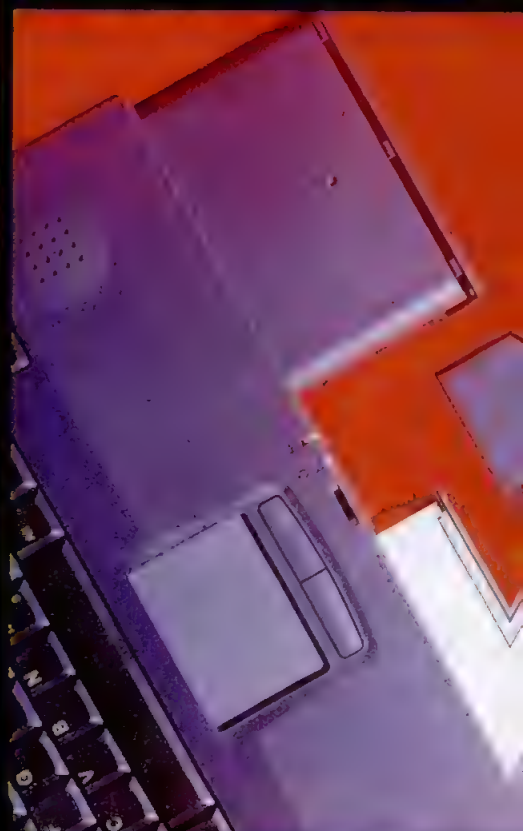
13.3-inch

1024-by-768 TFT display (high-end notebook) or 12.1-inch 800-by-600 dual-scan display (value notebook)

Li-Ion

Lithium ion
battery: 3 hours
runtime or more

WHAT TO LOOK FOR IN A GREAT PC NOTEBOOK



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PORTABLE DESKTOPS

You can take it with you. PC Labs tests 60 of the fastest notebook PCs with dazzling displays and great battery life. By Bill Howard

WHEN DOES A NOTEBOOK PC ACT LIKE A DESKTOP PC? These days, more often than you might think. Though the gap between the two—in terms of technology and capability—can yawn wide, that gap is closing.

What's pushing the two closer?

Although notebook CPU performance has lagged that of desktop PCs, Pentium MMX processors, announced in January, have come to notebooks in a big way: They're on nearly half the 60 systems here. By year's end, you'll see mobile MMX speeds of up to 233 MHz using the so-called Tillamook chip, marking the first time Intel has used a new manufacturing process first in notebook CPUs.

Disk space, an issue with notebook power users, is also increasing. Many of the systems reviewed have 3GB hard disks. Capacities will reach 5GB shortly. DVD drives, just coming to desktop PCs, will be available on notebooks in the fall.

Several of the notebook systems in this review have 13.3-inch LCDs, equal to the actual viewing area of many 15-inch desktop monitors. Shortly we should see 14-inch LCDs, which will be close to what a 17-inch



Integrated modem

with 56-Kbps or 33.6-Kbps data, 14.4-Kbps fax speed

166-MHz

mobile
(not desktop)
Pentium MMX;
200 to 233 MHz
later this year

3GB hard disk

with quick-release
connectors

Modular bay

for CD-ROM or floppy
disk drive, second
battery or hard disk,
or AC adapter

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Price/Performance Index: Pentium Notebooks

This crop of notebooks blurs the category lines, with some of our high-end systems packing in lots for your dollar.

Our two Editors' Choice winners in the high-end category, the \$5,599 Gateway Solo 9100 S5-166 and the \$5,899 Micron TransPort XKE, feature Pentium/166 MMX CPUs, 13.3-inch TFT XGA screens and 2.9GB hard disks, as well as great performance and battery life (2:52 for the Solo 9100 and 4:09 for the TransPort XKE). The Solo 9100 has 4MB of graphics RAM and Intel's Mobile Module. The TransPort XKE has 512K of L2 cache and both a touch pad and a pointing stick.

Two other high-end units offer lots of value. The \$3,079 Royal Mobile

Best Buy and the \$3,799 WinBook FX P166MMX both have 12.1-inch SVGA TFT screens and integrated 33.6-Kbps modems. But while the Best Buy uses a desktop Pentium/200 MMX (not well suited to portables), the P166MMX has a mobile Pentium/166 MMX CPU.

The \$3,619 Pentium/166 MMX-based Dell Latitude LM M166ST and the \$3,074 Pentium/133-based Gateway Solo 2200 S5-133, our value-class Editors' Choice winners, have good performance and competitive battery life (2:48 and 2:22, respectively). They have 12.1-inch TFT SVGA screens.

The Editors' Choice-winning IBM ThinkPad 560E (\$4,800 street) weighs just 4.1 pounds (6.2 pounds for travel) and is only 1.2 inches thick. It has a 12.1-inch TFT SVGA display, good

performance, and a battery life of 2:10.

If price is your main concern, check out a trio of value systems: the \$2,900 AMS TravelPro 187CT, the \$2,427 Micron TransPort VLX, and the \$2,499 WinBook FX P133. All except the Micron unit have TFT SVGA displays.—*Analysis written by Anush Yeghazarian*

THE DATA POINTS

Benchmark tests and tested battery life account for about 31 percent of the performance/features score. Travel weight, display technology, screen size, and maximum resolution supported make up 19 percent. Service and support policies and other features account for the rest. Chart data is available at www.pcmag.com.



Editors' Choice

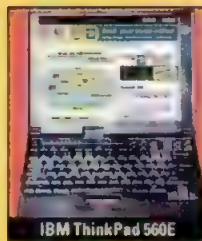
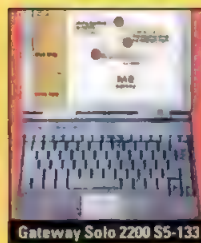
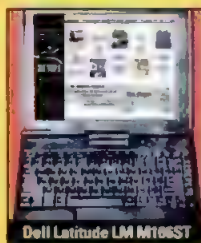
- High-end: Gateway Solo 9100 S5-166, Micron TransPort XKE
- Value: Dell Latitude LM M166ST, Gateway Solo 2200 S5-133
- Subnotebook: IBM ThinkPad 560E



The majority of notebooks sold today replace rather than complement desktop PCs. They have all the power most users need, including CD-ROM drives and high-resolution displays. And we were pleased with the build quality of most of the 60 units we tested.

Micron hit a home run with its first-ever notebooks a year ago. This year, the Micron TransPort XKE is the most powerful notebook we tested. And the Gateway Solo 9100 S5-166 is first with features you'll find on many notebooks later this year. Both have 13.3-inch XGA (up to 1,024-by-768) active-matrix displays, MMX/166 CPUs, 2.9GB hard disks, and modular bays for either a CD-ROM drive or a floppy disk drive. The TransPort XKE has excellent battery life and two pointing devices (touch pad and pointing stick). The Solo 9100 is the first with 4MB of graphics memory (for true-color displays on external XGA monitors) and the Intel Mobile Module, containing CPU, cache, PCI, and other support circuitry. Both are heavy, with travel weights over 9 pounds, and each costs between \$5,500 and \$6,000.

Standouts among the value systems (priced at roughly \$2,000 to \$3,500) aren't as clear. The most full-featured "value" system is IBM's ThinkPad 380D, which integrates all three drives in the system unit. But at more than \$4,000, it stretches the meaning of *value*. At \$3,074 (direct), the Gateway Solo 2200 S5-133 falls more into line, with a Pentium/133, a 12.1-inch TFT display, 2:48 battery life, and good performance. The other Editors' Choice value notebook,



the Dell Latitude LM M166ST, costs \$3,619 (direct) but includes an MMX/166 CPU. And Dell enjoys the highest score on our Service and Reliability Survey ratings.

Among subnotebooks, it's no contest: The \$4,800 IBM ThinkPad 560E is a class act. At just over an inch thick and a shade over 4 pounds, the 560 series still packs serious power: a 12-inch TFT display, 2.1GB hard disk, and Pentium/166 MMX processor. Unless you need an internal CD-ROM drive, there's no reason to look elsewhere.

At the high end, three systems merit honorable mention: the (Acer) Texas Instruments TravelMate 7060 for its 6:43 battery life, the Dell Latitude XPi CD M166ST for overall balance and Dell's service, and the Toshiba Tecra 740CDT for solid construction and included videoconferencing. We also liked the modular but pricey \$6,550 Compaq Armada 7750MT (with a built-in transformer) and the WinBook FX P166MMX (\$3,799), a high-end system with great battery life at a value price.

Among value systems, the WinBook FX P133 (\$2,499 direct) is the clear honorable mention, with an 11.3-inch TFT display, an integrated modem, excellent battery life (2:52), and average performance. A second value-system honorable mention goes to the \$2,900 AMS TravelPro 187CT for its speedy Pentium 150 CPU and 2GB hard disk.

CRT offers.

Desktop PCs are still more powerful than notebooks. But what's closing the gap the most is user perception. And that perception is: *Notebook PCs are powerful enough and capable enough.* We may want more power, but what we have is pretty good—good enough that nearly three out of every four notebooks sold today replace rather than complement desktop PCs.

REVIEW CRITERIA

For this roundup, PC Magazine Labs tested virtually every notebook PC shipping today. To be included, a vendor had to

have a battery-powered, color-display notebook PC shipping as of midspring. We sought systems in three categories:

- For *high-end notebooks* (also called desktop-replacement or presentation notebooks), we sought systems with 150-MHz or faster Pentium MMX processors, 32MB of RAM, and 3GB hard disks.
- For *value notebooks* (also called low-end or mainstream notebooks), aimed at the cost-conscious, we sought systems with 133-MHz or faster Pentium CPUs, 16MB of RAM, 1GB to 2GB hard disks, and 11.3-inch or 12.1-inch LCDs (either DSTN dual-scan or TFT active-matrix).

A CD-ROM drive was optional. We didn't set a price ceiling.

- For *subnotebooks* (also called lightweight or ultraportable notebooks), which accommodate users who want maximum portability, we sought units with system weights of 6 pounds or less (system weight includes the unit plus battery and internal CD-ROM drive, but not the transformer or any removable-media, floppy disk, or CD-ROM drives). Units could have CPUs of the vendors' choosing, 11-inch or larger displays, and 16MB of RAM.

All systems had to have modems, and both value and high-end notebooks had

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- 32MB EDO DRAM
- 2GB removable Hard Drive
- 33.6 Internal Fax/Data Modem
- 59-Watt Lithium Ion Smart Battery

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PC World
Top 20
WinBook FX



January 1998
PC Laptop
Editor's Choice –
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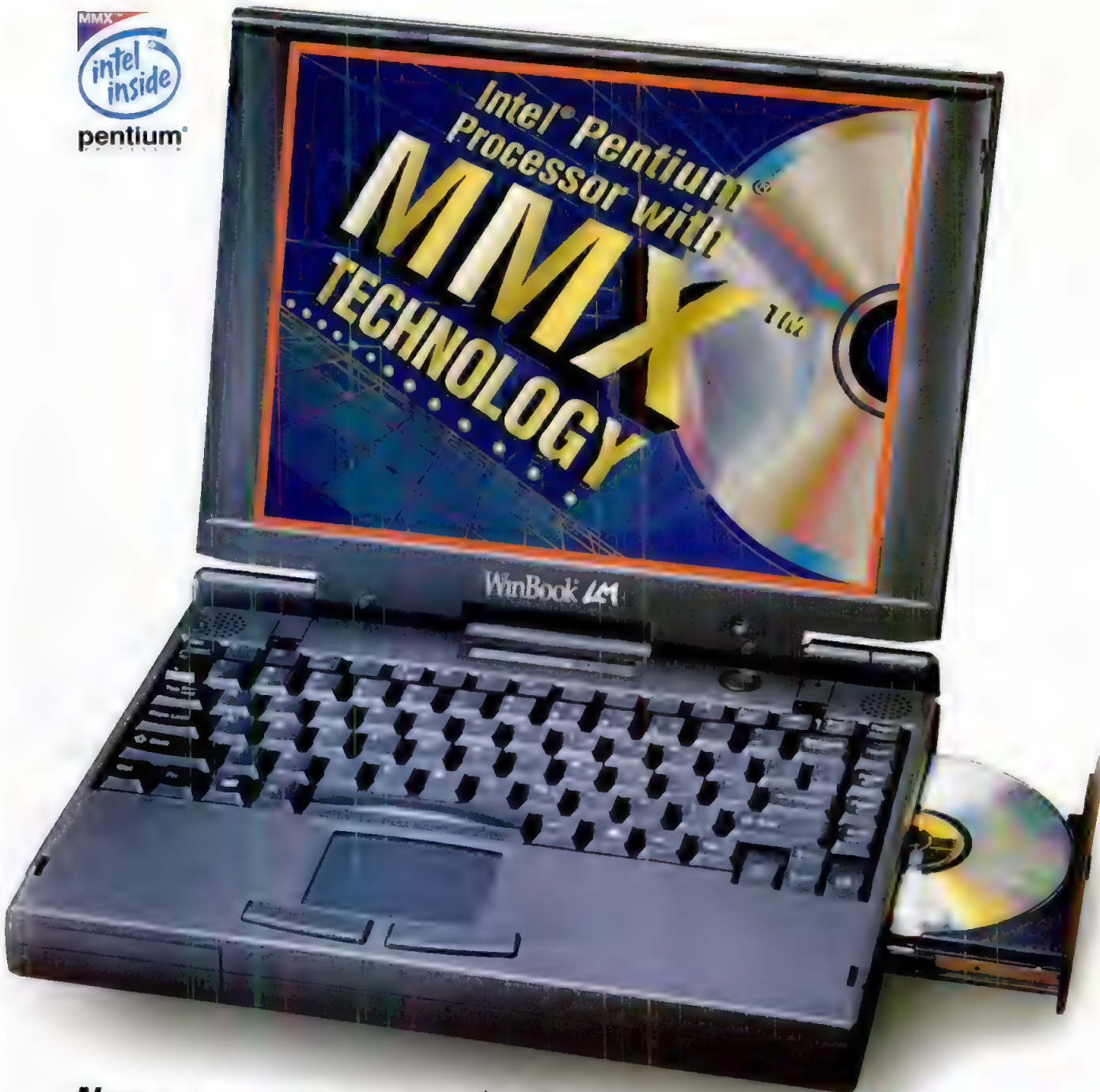


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Laptop Buyer's Guide
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TFT





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- 40MB EDO DRAM
- 2GB removable Hard Drive
- 33.6 PCMCIA Fax/Data Modem
- Options Bay accepts CD-ROM,

3.5" Floppy Drive (both included) or Optional 2nd Lithium Ion Battery

- **128-Bit Graphics Accelerator**
- Intel[®] Pentium[®] Processor with MMX[™] Technology, 150MHz, Running at 2.5V
- 16-Bit Soundblaster Pro-compatible

Stereo Audio

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WinBook LM



October 1996
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Best Value Notebook
WinBook FX



June 1997
PC World
Best Buy
WinBook XPS Pro



Laptop Buyer's Guide
July 1997,
WinBook FX
P166 MMX



July 1997
WinBook
WinBook XPS Pro



August 1996
PC Magazine
Editors' Choice
WinBook XPS P166

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to have sound capabilities built-in. You may see a few systems reviewed here with configurations slightly different from what's listed above, because we wanted to make sure the most useful configurations were tested (or because in some cases vendors played loose with the rules); any variances are noted in the reviews.

We invited vendors to submit for testing useful accessories such as port replicators, docking stations, specialty removable-media drives, or secondary batteries. Mindful that in the past vendors have promised users a raft of accessories and then didn't deliver, we made sure our Price/Performance Index and Suitability to Task boxes give extra credit to vendors offering accessories—but only if the vendors could get them to us.

As always, some vendors introduced systems too late for review, and others fell out for various reasons. New models from Toshiba were reviewed in our July issue's First Looks section, and new offerings from Digital, Hitachi, and Sony are reviewed in this issue's Trends/PCs section and First Looks. CTX International and Nimantics had notebooks eligible for review but were missed in our screening process.

TECHNOLOGY TRENDS

Modular device bays have become popular. So have highly configurable notebooks (Compaq's high-end Armada 7750MT is the best-known example)—basic models that can be high-end or low-end, depending on CPU, hard disk capacity, and screen type and size. The device bay lets you choose between a floppy disk and CD-ROM drive; you can carry neither, to shave a pound off the system weight, or in some cases insert a second battery and compute all the way to Buenos Aires. Companies like configurable PCs because one set of accessories works for everyone, and because it seems more egalitarian if everyone is carrying what appears, at least

1996 U.S. Notebook Sales

Vendor	Units sold	Market share (%)
1 Toshiba	1,198,752	23
2 IBM	556,880	11
3 Compaq	452,441	9
4 Dell	265,673	5
5 NEC	265,074	5
6 HP	220,949	4
7 Apple	198,560	4
8 TI	154,550	3
9 WinBook	148,750	3
10 AST	131,255	2
11 Gateway	99,337	2
12 ZDS	88,396	2
13 Digital	87,183	2
14 Acer	85,757	2
15 Fujitsu	77,700	1
16 Micron	50,220	1

Total
5,257,512
units sold

Other
1,176,035
units sold
(22%)

SOURCE: COMPUTER INTELLIGENCE

on the surface, to be the same notebook.

By fall, you'll see mobile MMX CPUs running at 200 and 233 MHz, in addition to the existing 150- and 166-MHz CPUs. In May, Intel backfilled its line with a 133-MHz mobile MMX and announced its new Mobile Module (MMO), which integrates the CPU (a 150- or 166-MHz mobile MMX), a portion of the supporting chip set, and the L2 cache on a single 2.5-by 4-inch module.

There are 14 200-MHz MMX CPUs in this roundup, but those are desktop parts that aren't conducive to long battery life. By the first half of 1998 (we hope), you can expect to see a mobile version of the Pentium II, the Pentium Pro offshoot that's equally comfortable running Microsoft Windows 95 and Windows NT. That's the CPU currently code-named Deschutes, and it will further close the performance gap between notebook and desktop PCs.

OTHER FEATURES

In the battle of pointing devices, the trackball is almost gone, a victim of finger-oil

buildup that affected tracking accuracy. The touch pad is winning out over the ultraprecise pointing stick (especially IBM's TrackPoint) because, vendors say, users who don't like pointing sticks complain loudly, while users who prefer the sticks find they can live with touch pads. A few vendors—such as Micron Electronics and WinBook Corp.—have both.

The Universal Serial Bus is appearing on notebooks, as it is on desktops, also with the promise that maybe later in the year there will be devices that use the USB. So far, though, no vendor has plans to remove the traditional serial, parallel, and keyboard ports anytime soon.

SUBNOTEBOOK VS. DOWNSIZED NOTEBOOK

The smallest notebook PCs are finally getting some respect and some market share. Mainstream users are discovering what road warriors have long known—you don't need a floppy disk drive all that often. That because many of the files you need to transfer require more space than a single 1.44MB floppy disk provides, and most users now are technically proficient at dialing in to the office to get needed files.

But will subnotebooks last? A significant minority of users need CD-ROM drives, at least occasionally, and that raises the system weight of subnotebooks to between 5.0 and 5.5 pounds (the first such example is Sony's new PCG-700 series, announced too late for testing). At the same time, mainstream CD-equipped notebooks are falling from 7 pounds to less than 6 pounds. And therein lies a quandary for notebook makers: It's hard to justify supporting two products with

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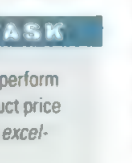
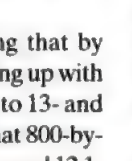
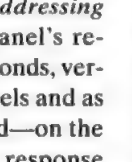
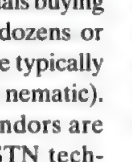
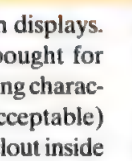
similar functionality that are less than a pound apart in weight. Come 1998, vendors may consider folding the two lines into one, leaving a market for the stockiest, highest-functionality beasts such as Toshiba's Tecra and IBM's 760 series, as well as truly small subnotebooks such as Toshiba's new 3.8-pound Portégé 300CT.

WILL TFT COSTS EVER DROP?

Every user wants the best, brightest display: the TFT (thin-film transistor), or active-matrix, panel. Demand has kept TFT displays about \$750 more than dual-scan displays. The best displays are usually bought for presenters (for whom the smearing characteristic of DSTN displays is unacceptable) and "gold-collar" workers with clout inside their companies, and by individuals buying for themselves. Fleet sales of dozens or hundreds of notebooks are more typically DSTN (dual-scan super-twisted nematic).

But help is on the way. Vendors are talking about a variant of DSTN technology called *multiline addressing* (MLA), which reduces the panel's response time to 50 to 75 milliseconds, versus 150 ms on most DSTN panels and as much as 500 ms—half a second—on the earliest color panels. Faster response means less smearing.

Panel makers are also saying that by early 1998, they should be catching up with demand and with the transition to 13- and 14-inch panels. Our opinion is that 800-by-600 resolution looks right on 11.3- and 12.1-



SERVICE & RELIABILITY: NOTEBOOK VENDORS

	Significantly better than average	Average	Significantly worse than average	Reliability	Repair	Technical support	Percent needing repair
Acer							
AST							
Compaq							
Dell							
Gateway							
Hewlett-Packard							
IBM							
Micron							
NEC							
Texas Instruments							
Toshiba							
WinBook							

We rate vendors that received at least 50 responses in our latest Service and Reliability Survey of 17,000 subscribers. For details, see our July 1997 issue, page 184. The **reliability** ranking is a measure of respondents' satisfaction with the reliability of the vendor's notebooks in use over the past two years. The **repair** and **technical support** rankings reflect the respondents' satisfaction with the vendor's repair service and support, respectively, for notebooks in use over the past two years. The **percent needing repair** ranking is a measure of the proportion of notebooks that the respondents indicated needed repair during the past 12 months. Here "significantly better than average" means the incidence of needed repairs was lower than average.

inch displays and users will find 1,024-by-768 comfortable only on 13.3-inch displays.

If you really care about your display quality, inquire about the vendor's dead-pixel policy. Many vendors ship LCD panels with a couple of defective pixels; panels also develop problems. Some vendors say only panels with zero defects are acceptable; others will replace a panel only if it has more than, say, five bad pixels.

MARKET TRENDS

Hope springs eternal, and as some vendors find the market too rough and drop out, others see great potential and hop in. Texas Instruments sold its notebook business to Acer. Canon and Olivetti have exited the notebook business in the U.S. Meanwhile, Fujitsu and Hitachi, two well-funded Japanese firms, have made a strong commitment to the U.S. market.

We expect the most significant market growth will occur in the value segment. For business users, the sweet spot is from \$3,000 to \$3,500, but for as little as \$2,000 you can buy a decent notebook with a 133-MHz CPU, 16MB of RAM, an 11.3-inch DSTN display, a 1GB hard disk, a modem, and in some cases, a CD-ROM drive.

NOTES ON TESTING

In testing, our reviewers were impressed by the general build quality of virtually all the units, even the ones from vendors that are far from household names. In fact, many of the household names are sourcing their basic units from the lesser-

known companies. Still, some vendors do more with the core systems than others; for instance, Dell Computer Corp. has a twin in Sceptre Technologies' SoundX 4500 but packed enough into its Latitude LM M166ST to win one of our Editors' Choice awards in the value category.

The notebooks here include 44 systems with 800-by-600 displays and 16 with 1,024-by-768 displays. Because you have to push around almost two-thirds more pixels on a 1,024-by-768 display (786,432 versus 480,000), it's harder for a higher-resolution display to get a good score on the Business Graphics WinMark test suite, our best measure of overall graphics performance for business users. We've flagged the higher-resolution units in the benchmark test tables to help you make comparisons.

The 31 high-end systems averaged a 34 on our Business Winstone 97 tests, versus a score of 25 for the 25 value systems. That's because faster processors, more memory, and sometimes more secondary (L2) cache are offered on the high-end systems. And the high-end notebooks hold their own against Pentium MMX/200 desktop PCs on the Business Winstone 97 tests; the highest scorer, the Micron TransPort XKE, uses a Pentium/166 MMX.

As performance has increased, battery life has held its own. When PC Labs tested 58 notebooks a year ago, the average battery life was 2:10. This year, the average was 2:17.

SUITABILITY TO TASK

Ratings reflect how well a product can perform a particular function or operation. Product price is not a factor. The possible ratings are *excellent*, *good*, *fair*, and *poor*.

The **desktop replacement** rating reflects the unit's ability to substitute for a desktop PC. It involves performance, screen resolution and size, and other factors.

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Dual Intel 200MHz Pentium® Pro processors
256MB ECC EDO RAM
Five 4GB Ultra-Wide SCSI-3 hard drives (20GB total)

STANDARD FEATURES

512KB integrated L2 cache
Mylex dual channel Ultra-Wide SCSI-3 RAID caching controller
w/4MB ECC RAM
Dual Pentium Pro ZIF sockets
Memory upgradable to 1GB (8 DIMM slots)
8 open expansion slots: 5 PCI, 2 ISA, 1 shared ISA/PCI
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress™ Pro 100 controller
Integrated SVGA graphics
12x variable speed SCSI CD-ROM drive, 3.5" floppy drive
5 internal, hot-swappable hard drive array bays (upgradable to 10)
3 external 5.25" media bays
1 (one) 330 watt power supply standard
(upgradable to 3 for added redundancy)
Microsoft® Mouse, 104-key keyboard
Microsoft Windows NT® Server 4.0 (10-user license)
Intel LANDesk Server Manager 2.52
Integrated hardware instrumentation
Dedicated server technical support, 7x24
5-year/3-year Micron Power™ limited warranty
1-year next-business-day on-site service*
NOS Support (3 incident resolutions/1st year), 7x24

\$13,499

Bus. lease \$424/mo.

MICRON VETIX Mx1

Intel 200MHz Pentium Pro processor
256MB ECC EDO RAM
Three 4GB Ultra-Wide SCSI-3 hard drives (12GB total)

STANDARD FEATURES

256KB integrated L2 cache
Dual Pentium Pro ZIF sockets
Memory upgradable to 1GB (8 DIMM slots)
8 open expansion slots: 5 PCI, 2 ISA, 1 shared ISA/PCI
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress Pro 100 controller
Integrated SVGA graphics
12X variable speed SCSI CD-ROM drive
3.5" floppy drive
5 internal, hot-swappable, hard drive array bays (upgradable to 10)
3 external 5.25" media bays
1 (one) 330 watt power supply standard
(upgradable to 3 for added redundancy)
Microsoft Mouse, 104-key keyboard
Microsoft Windows NT Server 4.0 (10-user license)
Intel LANDesk Server Manager 2.52
Integrated hardware instrumentation
Dedicated server technical support, 7x24
5-year/3-year Micron Power limited warranty
1-year next-business-day on-site service*
NOS Support (3 incident resolutions/1st year), 7x24

\$7,999

Bus. lease \$251/mo.

MICRON TRANSPORT™ Xx1

166MHz Mobile Intel Pentium processor with MMX
128MB EDO RAM
5GB removable hard drive
13.3" TFT XGA display

STANDARD FEATURES

Intel 430TX Mobile PCI chip set
512KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator, 2MB DRAM
20X modular CD-ROM drive with AutoPlay™
Pick-a-Point™ dual pointing devices
Sound Blaster 16-bit stereo sound
(supports surround sound and wavetable)
Built-in stereo speakers and microphone
Motorola Montana 33.6 fax/modem w/full telephony duplex phone
CardBus and zoomed video-ready
2 infrared ports, 1 front, 1 rear
S-video and NTSC-video capability, built-in game port
Management Pak, Executive Travel Pak
2 modular expansion bays (hard drive, CD-ROM drive,
3.5" floppy drive, lithium-ion battery)
Custom nylon carrying case
Microsoft Windows 95 and MS® Plus! CD
Microsoft Office 97 SBE CDs
5-yr/3-yr Micron Power limited warranty

\$5,999

Bus. lease \$388/mo.

MICRON TRANSPORT Xpe

166MHz Mobile Intel Pentium processor with MMX
32MB EDO RAM (80MB max)
2.1 GB removable hard drive
12.1" active matrix color display, 800x600

STANDARD FEATURES

Intel 430MX Mobile PCI chip set
256KB L2 pipeline burst cache
PCI graphics accelerator, 2MB VRAM
8X modular CD-ROM drive
Pick-a-Point dual pointing devices
Sound Blaster 16-bit stereo sound
Built-in stereo speakers and microphone
Motorola Montana 33.6 fax/modem
CardBus and zoomed video-ready
2 infrared ports, 1 front, 1 rear
S-video and NTSC-video capability
Built-in game port
Management Pak, Executive Travel Pak
2 modular expansion bays (hard drive, CD-ROM drive,
3.5" floppy drive, lithium-ion battery)
Custom nylon carrying case
Microsoft Windows 95 and MS Plus! CD
Microsoft Office 97 SBE CDs
5-yr/3-yr Micron Power limited warranty

\$4,099

Bus. lease \$340/mo.

* On-site service for the Vetix server is provided by Digital Equipment Corporation and is optional.

Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed by.



Appealing options.



MULTIMEDIA OPTIONS

32 voice wavetable stereo sound card	\$59
32 voice wavetable stereo sound card with 2MB RAM	\$99
Advent AV270 Powered Partners stereo speakers	\$79
Advent AV370 Powered Partners stereo speakers with subwoofer	\$199
Microsoft® SideWinder 3D Pro joystick	\$59
Microsoft SideWinder gamepad	\$39

STORAGE/MEDIA OPTIONS

Adaptec 2940U Ultra SCSI Fast-20 controller	\$100
upgrade from system with standard Ultra SCSI Fast-20 controller	
Plextor 12/20 Plext 3MB/sec SCSI internal CD-ROM drive	\$200*
upgrade from system with standard 12x EIDE CD-ROM drive	
Iomega Iaz SCSI drive with 1GB removable cartridge	\$299*
Iomega ZIP IDE drive with 100MB removable cartridge	\$99
Iomega 6-pack of 100MB Zip cartridges	\$99
Iomega Ditto 2000 (1.2GB)	
Travan tape backup drive with tape	\$149
Iomega Ditto 3200 (1.6/3.2GB)	
Travan tape backup drive with tape	\$199
Sony 4/8GB SCSI DDS-2	
tape backup drive with tape and software	\$899*
Seagate Backup Exec. for servers	\$249
Mylex dual channel Ultra-Wide SCSI-3 RMB caching controller with 4MB ECC RAM	\$899

COMMUNICATION OPTIONS

33.6 internal data fax modem	\$99
33.6 internal data/fax modem, speakerphone, voice mail	\$119*
33.6 external data/fax modem	\$299
56Kbps technology modem**	\$99

NETWORKING OPTIONS

3Com 3C509B EtherLink III ISA combo network adapter	\$79
3Com 3C900 EtherLinkXL PCI combo network adapter	\$99
3Com 3C905 Fast EtherLinkXL 10/100 PCI	
TPD network adapter	\$99
3Com OfficeConnect Hub 8/TPC	\$149
3Com OfficeConnect Switch 140	\$969

SOFTWARE OPTIONS

EdVenture Pak: Sheila Rae the Brave, Putt Putt Saves the Zoo, Reader Rabbit's Reading Development Library 1, Freddie Fish and the Case of the Missing Kelp Seeds, and the Thinkin' Things Collections 2	\$69
Quicken Financial Pak: Quicken Deluxe, Quicken Financial Planner, Quicken Parents' Guide to Money, Quicken Family Lawyer	\$69
CorelDRAW 7 full retail version	\$299
Corel WebMaster Suite full retail version	\$99
Novell Intranetware 4.11, 5-user license, for NetWare 3.11 only	\$699

HP PRINTERS

HP DeskJet 692c printer	\$319
HP DeskJet 870Cxi printer	\$419
HP LaserJet 6P printer	\$799
HP LaserJet 6Lxi printer	\$429

DISPLAY/VIDEO OPTIONS

17" Hitachi SuperScan CM630 (15.9" display) .26dp color monitor	\$150*
21" Hitachi SuperScan CM801 (20.0" display) .26dp color monitor	\$650*
Number Nine Imagine 128 series II video card, 4MB VRAM	\$299*
Number Nine Imagine 128 series II video card, 8MB VRAM	\$549*

TRANSPORT OPTIONS

MicronDock™ multimedia port replicator: ethernet 10BT LAN adapter, SCSI-2 port, S-video and NTSC-video output, built-in stereo speakers, infrared port, headphone, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2 ports (with warm dock and built-in game port - available on XPE models only)	\$299
Micron™ Executive™ desktop package: matching black 17" monitor (16.0" display), mouse, mousepad and keyboard (can be used with or without MicronDock)	\$699
Motorola Montana 33.6 fax/modem supports regular telephone connections, cellular phones and two-way paging devices	\$259

DIGITAL CAMERAS

Kodak Digital Science DC20 camera	\$199
Kodak Digital Science DC25 camera	\$399
Kodak Digital Science DC50 zoom camera	\$699

SCANNER OPTIONS

HP Scanjet 5s sheetfed scanner	\$269
HP Scanjet 5p flatbed scanner	\$399
HP Scanjet 4c flatbed scanner	\$799

EXTENDED DESKTOP SERVICE OPTIONS

Optional 1st year on-site service coverage included	
2nd year on-site service* coverage with system purchase	\$79
2nd year on-site service* coverage after system shipment	\$99
2nd and 3rd year on-site service* coverage with system purchase	\$99
2nd and 3rd year on-site service* coverage after system shipment	\$139

EXTENDED NOTEBOOK SERVICE OPTIONS

2nd and 3rd year parts and labor, 3-business-day turnaround for 3 years with system purchase	\$269
2nd and 3rd year parts and labor, 3-business-day turnaround for 3 years after system shipment	\$389
2nd and 3rd year parts and labor, 7-business-day turnaround for 3 years with system purchase	\$209
2nd and 3rd year parts and labor, 7-business-day turnaround for 3 years after system shipment	\$259

OTHER OPTIONS

APC Per7T surge suppressor	\$39
APC Pro7T surge suppressor	\$59
APC Smart-UPS 700 with PowerChute plus software	\$389
APC Smart-UPS 1000 with PowerChute plus software	\$529
Microsoft Natural Keyboard upgrade from standard keyboard	\$49

Upgrade from systems with standard 16-bit stereo sound card
Requires SCSI level adapter
Modem includes trial membership in CompuServe and America Online
Modem includes trial membership in CompuServe and America Online, requires sound card
Upgrade from systems with standard Micron U/ 17" color monitor
Upgrade from systems with standard 64-bit RAM video card
1st year on-site service is available in the United States and in limited areas in Canada from third-party service providers per customer's agreement with provider
2nd year and 3rd year offerings are available in the United States only
Some options and accessories available with system purchase only

*Available only on desktop and notebook systems with Microsoft Windows 95.

**Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading.

However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

MICRON POWER WARRANTY

5 year limited warranty on microprocessors and main memory
3 year limited partially system warranty - 1 year for Transport (U.S.)
1, 2 or 3 year optional on-site service agreement for Micron desktop and server systems
30 days of free Micron supplied software support for Micron desktop systems, 3 optional network operating system incident resolutions included for Micron server systems
30 day money back policy
24 hour technical support

The foregoing is subject to and qualified by Micron's standard warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.



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Acer America Corp.

Texas Instruments TravelMate 7060, AcerNote Light 383

Acer America Corp. hits both ends of the pricing spectrum with the value-class AcerNote Light 383 (\$2,600 street), which uses a Pentium MMX/150 processor, and the high-end Texas Instruments TravelMate 7060 (\$4,500 street), based on a Pentium MMX/166 processor. Both offer average performance, but the TravelMate lasted a whopping 6:43 on our battery test; the high-end average was 2:19.

Acer recently acquired Texas Instruments' mobile-computing business, including its high-end TravelMate and value Extensa lines. The company will sell products with both Acer and TI brand names.

The AcerNote offers an uncluttered design and an array of audio features, all in 7.1 pounds of travel weight. The 11.3-inch DSTN display can recline all the way back but, of course, lacks the richness of active-matrix screens. The unit lasted an impressive 4:01 on our BatteryMark test.

A 2GB hard disk, fixed 10X CD-ROM drive, and external floppy disk drive round out the machine. It comes with a 33.6-Kbps fax modem and a software bundle including Traveling Software's LapLink for Windows 95 and Intuit's Quicken SE.

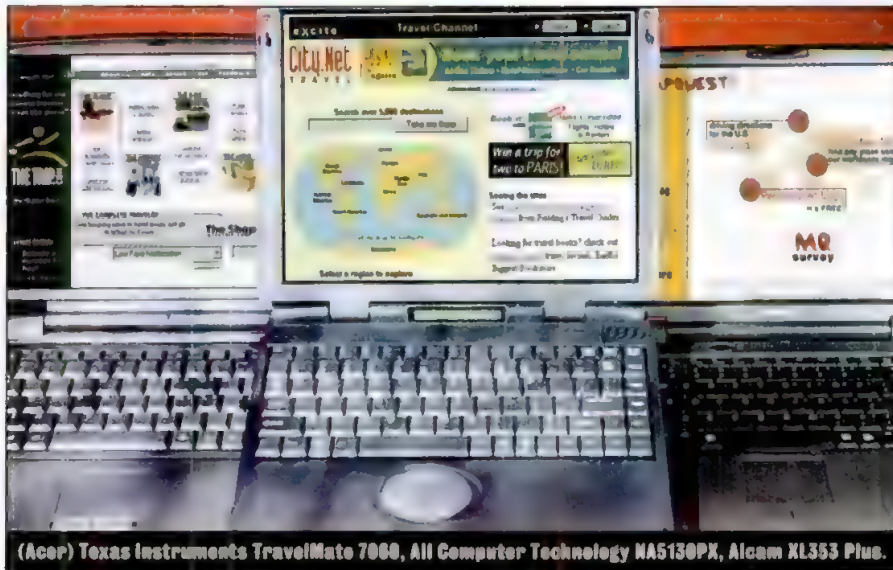
The TravelMate, with a travel weight of 8.4 pounds, is a leave-nothing-behind notebook. It has a 12.1-inch TFT display, a NeoMagic 128-bit graphics chip set, a 2GB IBM hard disk, and a 10X CD-ROM drive that you can swap for a floppy disk drive. You can use either drive externally.

The unit includes an integrated 33.6-Kbps DSVD voice

modem with an RJ-11 jack, and you can tilt up the keyboard. One thing you won't find is a power switch—just lifting the lid turns the TravelMate on. The unit comes with Acer Sleep Manager and a bundle of communications and data-transfer software.

The AcerNote and the TravelMate both offer good performance, thoughtful design, and excellent battery life.—Robert S. Anthony

Texas Instruments TravelMate 7060. Street price: \$4,500. **AcerNote Light 383.** Street price: \$2,600. Acer America Corp., San Jose, CA; 800-558-2237, 408-432-6200; fax, 408-922-2949; www.acer.com/aac. Circle 457 on reader service card.



(Acer) Texas Instruments TravelMate 7060, All Computer Technology NA5130PX, Alcam XL353 Plus.

Alcam Notebook Co.

Alcam XL353 Plus

Although the Alcam XL353 Plus (\$2,600 street), from Alcam Notebook Co., comes with an adequate array of features, the 133-MHz Pentium unit posted disappointing results on most of our benchmark tests. The 7.7-pound XL353 Plus, with a 12.1-inch active-matrix display, is in the middle of the company's XL series of active-matrix notebooks. Alcam also offers an FX series of

SUITABILITY TO TASK

	Desktop replacement	Road warrior
(Acer) TI TravelMate 7060	Good	Excellent
AcerNote Light 383	Good	Good
Alcam XL353 Plus	Fair	Good
All Computer Technology NA5130PX	Good	Good
All Computer Technology NM5120VX	Good	Fair

lower-priced dual-scan color notebooks.

The model, which has the same design as the Samsung SENS Pro 525 (also included in our roundup), includes Windows 95-specific keys, a two-button touch pad, a 1.3GB Toshiba hard disk, and a CD-ROM drive that can be swapped for a floppy disk drive. The floppy disk drive can also be used externally. Even with the cover closed, a row of small status LEDs is visible on the unit's front edge.

The XL353 Plus posted below-average scores on our Winstone 97, Business Graphics, and Disk WinMark 97 tests and on our CD-ROM WinMark 97 tests. The system's lithium ion battery lasted an adequate 2:22 on our BatteryMark test (2:20 was average

for the value units we tested).

This unit, bundled with an Apollo 33.6-Kbps PC Card fax modem with Cheyenne Communications' BitWare software, also has system boot and system utility CD-ROMs. An optional \$200 port replicator includes two PC Card slots and all standard I/O ports.—RSA

Alcam XL353 Plus. Street price: \$2,600.

Alcam Notebook Co., Northboro, MA; 888-292-5226, 508-393-5757; fax, 508-393-8257; www.alcam.com. Circle 458 on reader service card.

All Computer Technology

ACT NA5130PX, ACT NM5120VX

All Computer Technology, formerly All Computer Warehouse, offers the business market a pair of modest notebooks—one for the high end and one for the low. Both the ACT NA5130PX (\$4,898 direct) and the ACT NM5120VX (\$2,488 direct) can be purchased directly from the company or from a reseller.

The NA5130PX uses essentially the same design as two

A woman in a dark business suit is running through a brightly lit office hallway. She is looking back over her shoulder with a concerned expression. In the background, there is a large fire burning, and a man in a white shirt and light-colored pants is running away from the viewer towards the fire. The scene is chaotic and suggests a crisis or emergency.

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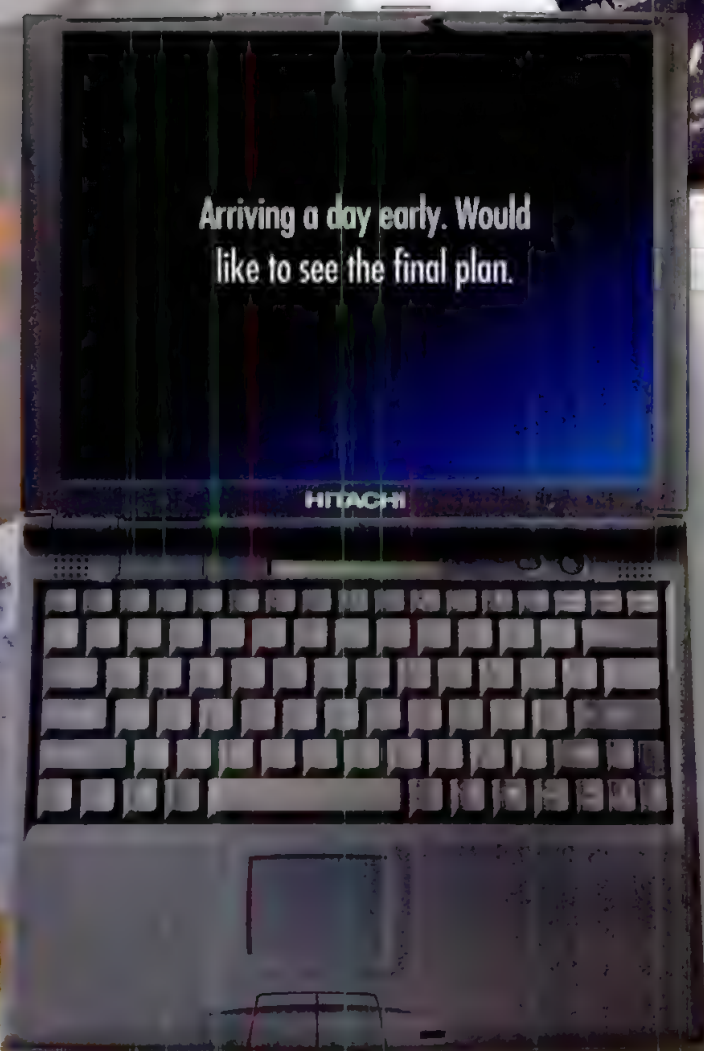
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other units we reviewed: the AMS TravelPro 2010CX and the Broadax XGA-1330. Using the desktop variety of Intel's 200-MHz Pentium MMX processor, this machine produced mixed results on our tests, including below-average Graphics WinMark and Disk WinMark scores and an average Winstone 97 score. The NA5130PX has a travel weight of 8 pounds.

A modular bay in the NA5130PX supports either the floppy disk drive, the CD-ROM drive, or a second lithium ion battery (\$199 extra). The unit also offers an integrated 33.6-Kbps modem, an NTSC video-in port, and a parallel-port cable for using the floppy disk drive externally. The system's two chief flaws—a 1:52 battery life and a rather noisy fan that turns on and off intermittently—are the result of the rather hot desktop processor.

The benchmark test results of the 133-MHz NM5120VX were average. But the 1.3GB Toshiba hard disk produced a Disk WinMark result that was below average. The unit lasted only 53 minutes on our BatteryMark test.

With an integrated floppy disk drive, an integrated CD-ROM drive, and a 33.6-Kbps PC Card modem, this bulky system has a travel weight of 8.6 pounds. Though the machine also includes an NTSC video-out port, its keyboard lacks dedicated End, PgUp, and PgDn keys. Two other notebooks offer the same design: the ARMNote TS97MX and the Jetta JetBook 6300CD. A one-year parts-and-labor warranty is included with each machine; on-site coverage is available for an additional charge.—Cade Metz

ACT NA5130PX. Direct price: \$4,898. **ACT NM5120VX.** Direct price: \$2,488. All Computer Technology, City of Industry, CA; 800-775-1953, 818-369-4181; fax, 818-961-7462; www.allcomp.com/acw. Circle 459 on reader service card.

AMS Tech Inc.

TravelPro 2010CX, TravelPro 187CT

AMS Tech's TravelPro 2010CX (\$5,000 street) is a typical high-end offering, while the TravelPro 187CT (\$2,900

the 187CT was a leading performer in the value category. With a 2GB Toshiba hard disk and a NeoMagic graphics chip set (with 1.5MB of DRAM), it had mostly above-average performance, save for an average score on our CD-ROM WinMark test. It also lasted an impressive 3:10 on our BatteryMark test.

This model includes a modular bay (for a CD-ROM or floppy disk drive), a cable for an external floppy disk drive, and an internal 33.6-Kbps modem. Relatively light, at a travel weight of 7.4 pounds, it can also connect to a docking station (\$450) and port replicator (\$200). The 2010CX will get the job done, but the 187CT is the real value.—CM



ARMNote TS97MX, AMS TravelPro 2010CX, AST Ascentia P80.

street)—with its 150-MHz CPU—is a prime machine for the value-minded buyer.

The 2010CX uses a 166-MHz desktop Pentium MMX CPU. With this CPU, a Chips and Technologies graphics chip set (with 2MB of DRAM), and a 2GB Toshiba hard disk, our unit posted below-average Graphics and Disk WinMark scores. All its other scores were average. The unit ran for 1:30 on our battery test—well below the high-end average of 2:19.

This system, with a travel weight of 8.1 pounds, includes an NTSC video-in port, a 33.6-Kbps modem, and Zoomed Video support. Its modular bay accommodates a floppy disk drive, a CD-ROM drive, or a second battery (with plastic adapter case).

A rear port lets users connect to either a docking station (\$550) or a port replicator (\$200). The replicator offers video-in and video-out ports in addition to standard PC ports. The 2010CX is similar to the ACT NA5130PX and the Broadax XGA-1330.

Outfitted with a mobile 150-MHz CPU,

TravelPro 2010CX. Street price: \$5,000. **TravelPro 187CT.** Street price: \$2,900. AMS Tech Inc., Irwindale, CA; 800-886-2671, 818-814-8851; fax, 818-814-0782; www.amstech.com. Circle 460 on reader service card.

ARM Computer Inc.

ARMNote TS97MX

The ARMNote TS97MX, from ARM Computer, is proof that looks can deceive. The generic case hides a 200-MHz Pentium MMX processor and a 128-bit NeoMagic graphics chip set that's both powerful and fast. The performance of the ARMNote—average save for above-average Winstone and Graphics WinMark scores—makes it a super value at \$3,300 (street price).

Still, this product is not without its flaws. Foremost among them is the blaze behind the ARMNote's speed—the unit we tested lacked a fan to cool the desktop (not mobile) CPU. Also, its occasionally inaccurate manual does not offer any contact information. ARM does offer a year of free on-site service.

The 2.9GB hard disk slides out, and the keyboard can be re-

SUITABILITY TO TASK

	Desktop replacement	Road warrior
AMS TravelPro 2010CX	Good	Good
AMS TravelPro 187CT	Good	Good
ARMNote TS97MX	Good	Good
AST Ascentia P80	Good	Excellent

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Integrated U.S. Robotics 56K x2 modem
Detachable filebase with 10x CD ROM
and 3.5 floppy drive (not shown)
16MB EDO RAM. 2.1 GB hard drive.
Optional extended life Lithium-Ion battery
Optional advanced port replicator.
full-size keyboard



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Multi-media capabilities, integrated communications, value leading price

SIGNIFICANT FEATURES

- Intel Pentium processor with MMX technology up to 100MHz
- US Robotics 33.6Kbps fax/data modem
- Vibrant 12" display SVGA resolution
- 2MB DRAM video memory
- 16MB EDO RAM upgradeable to 128MB
- 144 or 2.1GB removable hard drive
- 10x C.D ROM swaps with floppy drive
- PC Card slots (two Type II or one Type III)
- SoundBlaster Pro-compatible sound
- Full-size keyboard



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MMIO: <https://www.intel.com/content/www/us/en/processors/xeon/xeon-phi-processor-architecture.html>

CIRCLE 143 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Battery Life vs. Portability

The battery scores in this roundup range from 52 minutes to almost 7 hours. Since these units are loaded with desktop-equivalent CPUs, displays, and hard disks, some of these scores represent major coups in power-efficiency engineering. Also, we saw lithium ion batteries in most of the notebooks (47 of 60), even those in the value lines: lithium ion batteries have more charge cycles and pack more energy per weight than the less expensive nickel hydride variety—so the overall cost is not too different. All machines were tested using our Battery-Mark test, which simulates a real user's

computing habits, down to the lulls in which the user is "thinking."

The clear champion, lasting 6:43, was the (Acer) Texas Instruments Travel-Mate 7060, a Pentium MMX/166-based unit with a 12.1-inch TFT screen and a 2GB hard disk. The next-closest competitor, the Micron TransPort XRE, persevered for 4:09, despite a 13.3-inch TFT screen. The majority of the high-end units ranged from 1 to 3 hours; the group average was 2:19.

The value notebook group were less dramatic but still impressive. The group high of 4:01 was posted by the Acer-Note Light 383, a Pentium MMX/150

unit offering a 11.3-inch DSTN display and a 2GB hard disk. Second at 3:10 was the AMS TravelPro 187CT, a Pentium/150 unit with a 12.1-inch TFT display and a 2GB hard disk. The majority of these machines were in the neighborhood of 2 hours, and the average was nearly identical to that of the high-end category: 2:20.

There were only four subnotebooks in this roundup, and their average battery life was 1:57. The Compaq Armada 4131T was the leader, at 2:29, and the Fujitsu LifeBook 655Tx trailed the field at 1:18.—*Analysis written by Mary E. Behr*



	Travel weight Pounds	Main battery weight Pounds	2D BatteryMark score Hours:minutes	Battery life per pound of battery weight Hours:minutes
HIGH-END NOTEBOOKS				
(Acer) Texas Instruments TravelMate 2000 (MMX/100)	8.4	1.3	6:43	5:10
All Computer Technology ACT 8A5130FX (MMX/200)	8.8	0.8	1:32	2:04
AMS TravelPro 2010CX (MMX/100)	6.1	0.9	1:30	1:40
ARMNote TS97MX (MMX/200)	6.2	1.0	1:41	1:41
AST Ascentia P80 (MMX/100)	8.5	1.3	3:42	2:00
Brick Ergo CD-PowerBrick (MMX/200)	6.5	1.0	1:31	1:11
Broadax XGA-1330 (MMX/200)	6.0	0.0	1:13	1:13
Compaq Armada 7750MT (MMX/100)	6.9	0.9	3:31	3:34
Dell Latitude XP1 CD M1000T (MMX/100)	6.3	0.9	3:14	3:26
DFI 8120 (MMX/200)	6.5	0.8	2:02	2:16
Digital HiNote VP 575 (MMX/100)	7.0	1.0	2:42	2:42
EPS Apex XL-200MMX (MMX/200)	6.0	0.8	1:36	1:36
Foss AP 1500T (MMX/133)	6.8	0.9	1:32	1:42
FutureTech FutureMate M3720TA (MMX/200)	8.2	0.9	1:33	1:43
Gateway Solo 9100 S5-100 (MMX/100)	7.2	1.3	2:02	2:12
Hewlett-Packard OmniBook 5710CTX (MMX/100)	7.9	0.9	2:21	2:36
Hitachi VisionBook Pro (MMX/100)	6.3	1.1	2:16	2:05
IBM ThinkPad 7650 (MMX/100)	6.4	0.8	1:52	2:20
Jetta JetBook 7000+ (MMX/200)	6.0	1.4	2:00	1:29
Keydata KeyNote 8000 XP (MMX/200)	6.2	0.8	1:38	1:38
Micron TransPort XKE (MMX/100)	6.1	1.0	4:00	3:11
Micro X MX Edge (MMX/200)	7.0	0.9	1:12	1:20
MGS 200MMX Power User (MMX/200)	6.0	0.0	1:32	1:42
NEC Versa 6200MX (MMX/100)	6.7	0.8	2:02	1:30
Royal Mobile Best Buy (MMX/200)	6.1	1.2	1:30	1:22
Samsung SENS Pro 525 (MMX/100)	7.0	1.0	2:02	2:02
Scaptre SoundX 4080 (MMX/100)	7.5	1.0	2:42	2:42
Toshiba Tecra 740CDT (MMX/100)	6.5	1.2	2:40	2:10
Transmode Vibrant 100TAX (MMX/100)	6.0	1.0	6:32	6:40
Twinhead Slimnote-8100T2 (MMX/100)	6.1	1.0	2:12	2:12
WinBook FX P100MMX (MMX/100)	6.5	1.3	3:42	2:30
MAINSTREAM				
AcerNote Light 303 (MMX/100)	7.1	1.1	4:01	3:30
Aicam XL303 Plus (P/133)	7.7	0.0	2:22	2:37
All Computer Technology ACT NM5120FX (P/133)	6.6	1.4	0:30	0:37
AMS TravelPro 187CT (P/100)	7.4	0.0	2:10	2:31
Broadax NP6200A (MMX/200)	6.4	1.3	1:31	1:10
ChemBook 8000 (P/133)	6.2	1.0	1:32	1:10
Compaq Armada 1520DM (P/133)	7.0	0.0	2:02	2:00
Dell Latitude LM M100ST (MMX/100)	7.2	1.0	2:22	2:22
EMPaC Classic 5100 (P/100)	6.0	1.0	2:40	2:40
Eversp StepNote MX (MMX/100)	7.9	1.4	2:12	1:49
Fujitsu LifeBook 531T (P/133)	6.5	1.0	2:01	2:01
FutureTech FutureMate FM613D (P/133)	7.7	1.0	2:40	2:42
Gateway Solo 2200 S5-133 (P/133)	7.0	0.8	2:40	2:30
Hewlett-Packard OmniBook 2300 (MMX/133)	7.1	0.9	2:49	3:07
IBM ThinkPad 3000 (MMX/100)	7.0	0.0	2:42	2:30
Jetta JetBook 6300CD (P/133)	6.7	1.4	2:00	1:29
Maximus Medianote CD Book (MMX/100)	6.2	1.2	1:40	1:30
MaxTech YesBook Model 733Plus (MMX/100)	6.4	1.0	2:00	2:00
Micron TransPort VLX (P/100)	6.2	1.4	2:02	1:40
Micro X MX Extra (P/100)	7.0	0.0	1:47	1:50
NEC Versa 2050CD (MMX/100)	6.9	1.2	1:40	1:30
Olivetti Echo Pro 133S (P/133)	6.4	1.0	1:52	1:50
Sharp PC-9300T (P/100)	6.4	1.3	2:12	2:41
Toshiba T100-5000 (P/133)	6.9	0.0	2:12	1:41
WinBook FX P133 (P/133)	6.4	1.2	2:12	2:21
Compaq Armada 4131T (P/133)	7.1	0.9	2:29	2:46
Fujitsu LifeBook 650T (MMX/150)	6.9	0.0	1:10	1:10
Hewlett-Packard OmniBook 800CT (P/100)	6.8	0.4	1:02	0:43
IBM ThinkPad 600E (MMX/100)	6.2	0.7	1:10	1:00

moved for memory access. Both the CD-ROM and floppy disk drives are fixed. The 33.6-Kbps modem occupied one of two Type II slots; CardBus should be added by press time.

The unit offers a 12.1-inch SVGA TFT display and built-in multimedia capabilities for a travel weight of 8.4 pounds. The unit lasted 1:41 on our BatteryMark test. It shares the same design as the Jetta JetBook 6300CD and the ACT NM5120VX. Flaws aside, this unit has a lot to offer.

—Winn L. Rosch

ARMNote TS97MX. Street price: \$3,300. ARM Computer Inc., Milpitas, CA; 800-765-1767, 408-935-9800; fax, 408-935-9192; www.armcomputer.com. *Circle 461 on reader service card.*

AST Computer

Ascentia P80

The Ascentia P80 (\$4,800 street), equipped with exemplary hard disk and CD-ROM subsystems, was one of this roundup's leading performers on many of our benchmark tests. Such merits make it a worthy corporate purchase.

At 8.5 pounds (travel weight), the P80—which uses the same design as the WinBook FX P133—contains a 166-MHz mobile Pentium MMX CPU, the 430MX chip set, a 2.9GB IBM hard disk, and a 10X Toshiba CD-ROM drive. These components led to above-average CD-ROM WinMark, Disk WinMark, and Winstone scores. Its Graphics WinMark result was also above average, as was its battery performance: The P80 ran for 3:42 on our BatteryMark test.

The model features a 12.1-inch TFT display. It also has a serviceable touch pad, which is, however, awkwardly placed in the center of the palm rest.

This unit also included a 28.8-Kbps internal modem, a MIDI port, and a modular bay holding either a floppy disk or CD-ROM drive. The P80 ships with LapLink for Windows, Puma Technology's TranXit, and McAfee's VirusScan. With top-notch performance and some good features, the P80 is a good choice.

—CM □

Ascentia P80. Street price: \$4,800. AST Computer, Irvine, CA; 800-876-4278, 714-727-4141; faxback, 800-926-1278; www.ast.com. *Circle 462 on reader service card.*

BENCHMARK TESTS

Pentium Notebooks



Intel's move to a single chip set for both mobile and desktop systems made it clear: Portability no longer means poor performance.

Intel's 430TX PCIs set is not the most prevalent among mobile chip sets in our roundup of 60 new notebooks, but it sets the pace by propelling the top scorers to desktoplike performance. The Pentium MMX CPUs, which have quickly migrated to notebooks, the portable hard disks that are nearly as big and fast as desktop IDE drives, the increase in L2 cache to 512K, and the 12.1-inch and 13.3-inch LCD screen sizes, which are effectively equivalent to 14- and 15-inch CRT monitors, all demonstrate that today's portables are not made with hand-me-down technologies. At last we can claim that "desktop replacements" have become a reality.

When you unplug these systems, you'll find that battery times

▲ Higher scores represent better performance.
▼ Lower scores represent better performance.
Bold type denotes first place within each category.

	ZD Business Winstone 97 Score	ZD Business Graphics WinMark 97 Score	ZD Business Disk WinMark 97 Thousands of bytes per second	ZD CPUmark32 Score	ZD CD-ROM WinMark 97 Thousands of bytes per second	ZD BatteryMark 2.0 Hours:minutes
HIGH-END NOTEBOOKS						
(Acer) TI TravelMate 7060	33	49	741	304	902	6:43
ACT NA5130PX	33	44	604	361	705	1:52
AMS TravelPro 2010CX	32	39	633	327	728	1:30
ARMNote TS97MX	38	65	732	323	748	1:41
AST Ascentia P80	38	57	788	329	889	3:42
Brick Ergo CD-PowerBrick ³	37	65	657	335	745	1:11
Broadax XGA-1330	33	43	615	358	689	1:13
Compaq Armada 7750MT	38	73	719	314	615	3:31
Dell Latitude XPI CD M166ST	34	53	891	291	794	3:14
DFI 8120	38	58	850	349	723	2:02
Digital HiNote VP 575	38	62	732	344	796	2:42
EPS Apex XL-200MMX	34	41	663	365	727	1:20
Fosa AP 6300T	34	59	632	331	862	1:32
FutureTech FM9720TA	34	43	629	335	725	1:33
Gateway Solo 9100 S5-166	38	59	761	349	906	2:52
HP OmniBook 5700CTX	33	40	694	318	814	2:21
Hitachi VisionBook Pro	36	51	704	360	907	2:18
IBM ThinkPad 765D	32	35	755	313	627	1:52
Jetta JetBook 7000+	36	48	861	355	746	2:00
Keydata KeyNote 8660 XP	30	43	612	327	698	1:20
Micron TransPort XKE	42	89	965	370	862	4:09
Micro X MX Edge	32	39	667	328	693	1:12
MOS 200MMX Power User	32	49	616	320	869	1:32
NEC Versa 6200MX	36	44	777	301	875	2:02
Royal Mobile Best Buy	33	51	616	293	729	1:39
Samsung SENS Pro 525	25	35	653	270	877	2:52
Sceptre SoundX 4500	38	61	722	338	789	2:42
Toshiba Tecra 740CDT	34	46	640	325	900	2:49
Transmonde Vibrant 166TMX	25	30	640	164	680	0:52
Twinhead Slimnote-9166TZ	33	52	613	300	896	2:12
WinBook FX P166MMX	38	56	732	328	916	3:42

BETTER ►

BETTER ►

BETTER ►

BETTER ►

BETTER ►

BETTER ►

N/A*—Not applicable. The product did not complete this test. (1) We tested this product at 1,024-by-768 resolution. (2) With an Action, Indeo, 160 x 120, 30-fps, 300-Kbps clip.

Continues

have also improved, though not as radically as performance. But considering the higher CPU clock speeds and larger screens, the modest improvement in battery life is more significant than it appears. Longer battery life is a result of more power-efficient notebook designs as well as the proliferation of Intel's TCP (tape carrier package) with VRT (Voltage Regulation Technology).

With the advent of XGA displays, we saw 14 of 32 high-end notebooks supporting 1,024-by-768 resolution. We tested the units at their native resolutions. We discourage cross-comparison among notebooks with different display settings: The 1,024-by-768 notebooks score lower on certain tests because their display

controllers must move more pixels. We estimate that a notebook running at 1,024-by-768 resolution may perform about 3 percent lower on our Winstone tests and 10 to 20 percent lower on our Graphics WinMark tests than the same notebook running at 800-by-600 resolution.

ZD Business Winstone 97 The Business Winstone 97 tests rate a system's performance in each of three application categories (database, publishing, and spreadsheet/word processing) in order to project overall performance in a real business setting. While we detect less obvious patterns in performance connected with

CPUs, hard disks, graphics chips, and even the cache size, the chip set exhibits the strongest correlation with good Winstone scores. The Intel chip sets (430TX and 430MX) were behind seven of the top nine Winstone scores, whereas five of the bottom eight scores were the result of using OPTi chip sets.

Several high-end units scored on a par with desktops in the corresponding processor classes. With a 166-MHz Pentium MMX, Micron's TransPort XKE earned a score of 42, which betters the second-best high-end unit by more than 10 percent and puts many 200-MHz Pentium MMX desktops to shame. Other desktop-class performers included the ARMNote TS97MX, AST Ascentia P80, Compaq Armada 7750MT, DFI 8120, Digital HiNote VP 575, Sceptre SoundX 4500, WinBook FX P166MMX, and Brick Ergo CD-PowerBrick³. The highest-scoring machines in the value category on these tests, the AMS TravelPro 187CT and the IBM ThinkPad 380D, also came close to desktops that have equivalent CPUs and memory. The fastest among the subnotebooks was the IBM ThinkPad 560E. Maximus Computers' value unit scored a dismal 20 on our Winstone tests, unbecoming a 166-MHz Pentium MMX-based notebook. The only standout feature in this notebook is its Sunrex motherboard with a VIA Master 82C570MV chip set. Maximus, however, declined to comment on its notebook's inexplicably low performance.

ZD Business Graphics WinMark 97

The Graphics WinMark tests rate the graphics subsystem—the chip set, memory, RAMDAC, and driver, as well as the system's memory and bus architecture. We saw more 64-bit graphics chip sets in this year's roundup than we did last year. NeoMagic's graphics solution, with the graphics engine, RAMDAC, and memory integrated into one chip, powered most of the top performers in every

CD-ROM			Full-Screen Scaling²		High-Quality Action Cinepak³	
Sequential 16K Read (thousands of bytes per second) ▲	Access Time (ms) ▼	CPU Utilization (percent) ▼	Frames Dropped ▼	CPU Utilization (percent) ▼	Frames Dropped ▼	CPU Utilization (percent) ▼
1,150	149	52	1	34	241	96
1,210	226	52	5	88	334	95
974	189	37	3	88	328	94
1,220	213	64	1	30	194	95
1,150	162	53	1	27	314	94
1,210	206	64	1	29	191	95
1,220	216	52	5	88	332	93
1,200	215	49	1	26	83	94
1,320	180	64	1	35	242	97
972	178	52	0	29	254	96
1,230	164	57	1	26	129	95
986	188	37	4	88	331	95
1,370	205	61	0	28	219	95
971	188	35	2	87	315	95
1,150	153	7	1	18	45	95
1,150	165	40	1	31	237	97
1,150	155	32	1	20	184	97
1,180	217	54	0	28	249	98
976	168	52	0	30	283	96
975	202	35	3	88	322	96
1,400	178	22	1	16	0	42
1,210	221	51	6	89	375	81
1,380	207	80	0	29	219	95
1,150	159	32	1	24	53	96
1,320	209	50	1	33	223	96
1,150	151	79	1	50	422	93
1,210	179	58	1	26	135	94
1,150	150	71	0	57	314	96
1,220	219	93	1	N/A*	309	92
1,150	154	51	0	29	183	96
1,150	148	54	1	26	315	94

(3) With an Action, Cinepak, 640 x 480, 30-fps, 900-Kbps clip.

BENCHMARK TESTS

category. The Micron TransPort XKE, using a fourth-generation NeoMagic chip, the NM2160, with 2MB of EDO DRAM, scored 69—a respectable result for a desktop. But even this impressive score was outclassed by that of the Compaq Armada 7750MT, which used S3's Aurora 64V+ chip set to score an impressive 73. The value notebook winners were the AMS TravelPro 187CT, Dell Latitude LM M166ST, MaxTech YesBook Model 753Plus, Everex StepNote MX, and IBM ThinkPad 380D; all were equipped with NeoMagic's NM 2093 or 2090 chip set. And most of the subnotebooks bettered many of the value notebooks. The most prevalent (but mediocre) graphics chip sets in this review were Chips and Technologies' 64-bit CT65550 and CT65554; a year ago, the CT65550 was an industry performance leader.

ZD Disk WinMark 97 The standard capacity of hard disks for notebooks has been bumped up to from 2GB to 3GB. The portable disks' spindle speed, however, has remained 4,900 rpm, compared with the desktop IDE standard of 5,400 rpm. The slower notebook disks can still approach desktop performance because of higher data density on the platters.

IBM and Toshiba accounted for all but seven hard disks in this story. IBM's had the performance edge over Toshiba's. IBM-equipped notebooks captured 8 of the top 12 DiskWinMark scores in the high-end category; the IBM DLGA-23080 disk used in the Micron TransPort XKE and the Dell Latitude XPI CD M166ST topped the list with scores of 985 and 891, respectively. The value category, with widely varying processors, showed less

▲ Higher scores represent better performance.
▼ Lower scores represent better performance.
Bold type denotes first place within each category.

	ZD Business Winstone 97 Score	ZD Business Graphics WinMark 97 Score	ZD Business Disk WinMark 97 Thousands of bytes per second	ZD CPUmark32 Score	ZD CD-ROM WinMark 97 Thousands of bytes per second	ZD BatteryMark 2.0 Hours:minutes
VALUE NOTEBOOKS						
AcerNote Light 383	26	39	560	277	806	4:01
Alcam XL353 Plus	21	31	411	245	547	2:22
ACT NMS120VX	26	42	427	250	721	0:53
AMS TravelPro 187CT	32	58	563	294	729	3:10
Broadax NP6280A	29	48	515	317	856	1:31
ChemBook 6800	25	38	466	238	725	1:32
Compaq Armada 1520DM	18	21	442	208	677	2:42
Dell Latitude LM M166ST	29	58	509	313	715	2:22
EMPaC Classic 5168	26	39	511	280	867	2:40
Everex StepNote MX	28	50	469	314	699	2:32
Fujitsu LifeBook 531T	28	43	526	259	747	2:31
FutureTech FM4013D	28	44	538	262	714	2:42
Gateway Solo 2200 S5-133	27	41	527	242	794	2:48
HP OmniBook 2000	27	34	593	188	878	2:49
IBM ThinkPad 380D	31	50	616	303	705	2:42
Jetta JetBook 6300CD	17	20	449	159	672	2:05
Maximus Medianote CD Book	20	30	482	130	868	1:49
MaxTech YesBook Model 753Plus	28	51	535	294	747	2:02
Micron TransPort VLX	27	42	514	240	687	2:32
Micro-X MX Extra	22	29	472	196	617	1:41
NEC Versa 2650CD	27	39	512	274	780	1:49
Olivetti Echo Pro 133S	24	31	582	254	671	1:52
Sharp PC-9300T	22	35	433	235	748	2:12
Tatung TNB-5500	21	28	459	208	723	2:12
WinBook FX P133	24	35	526	255	550	2:52
SUBNOTEBOOKS						
Compaq Armada 4131T	23	28	510	233	615	2:29
Fujitsu LifeBook 655Tx	31	50	545	289	733	1:18
HP OmniBook 800CT	34	54	622	335	N/A**	1:53
IBM ThinkPad 560E	35	50	704	325	395	2:10
	BETTER ►	BETTER ►	BETTER ►	BETTER ►	BETTER ►	BETTER ►

N/A—Not applicable. The product did not complete this test. N/A**—Not applicable. The product does not have a CD-ROM drive.

Continues

discernible patterns, but IBM still garnered five of the top ten scores; the IBM ThinkPad 380D (with the IBM DSOA-2108 drive) sat atop the list.

ZD CPUmark₃₂ CPUmark₃₂ exclusively tests the processor and its supporting components: the chip set, L2 cache, and memory. For the high-end and value categories, memory was fixed (16MB for value and 32MB for high-end) with a couple of exceptions (the Samsung SENS Pro 525 and Transmonde Vibrant 166TMX were tested with 48MB of RAM because that is how these units are sold). The CPUs ranged from 133-MHz Pentiums to 200-MHz Pentium MMXs in the value category and included 150-MHz, 166-MHz, and 200-MHz Pentium MMXs in high-end

notebooks. In the high-end category, with less variation in CPUs, the variable was cache size; thus the units with 512K of L2 cache were grouped at the top. They included the Micron TransPort XKE, EPS Apex XL-200MMX, All Computer Technology ACT NA5130PX, Hitachi VisionBook Pro, and Broadax XGA-1330. The value category was influenced more by the CPUs themselves. The Intel chip sets that contributed to high Winstone scores were also found among the top CPUmark₃₂ scores in each processor category. The aforementioned Maximus Computers value notebook achieved less than half of the CPUmark₃₂ score typically generated by notebooks of its processor class. Based on this data, we suspect that the notebook's poor performance was mainly due to its failure to run its CPU at the specified maximum clock speed of 166 MHz.

CD-ROM			Full-Screen Scaling²		High-Quality Action Cinepak³	
Sequential 16K Read (thousands of bytes per second) ▲	Access Time (ms) ▼	CPU Utilization (percent) ▼	Frames Dropped ▼	CPU Utilization (percent) ▼	Frames Dropped ▼	CPU Utilization (percent) ▼
1,120	187	45	1	35	244	90
1,100	165	57	6	45	408	54
1,210	214	65	1	33	244	90
1,230	164	64	1	29	185	95
1,380	212	61	0	28	250	93
1,220	215	53	N/A*	N/A*	257	94
975	201	39	1	61	420	68
1,310	202	63	1	27	184	90
1,150	154	49	0	30	193	94
1,300	212	92	1	38	421	79
976	178	45	0	48	302	95
1,320	199	63	0	46	54	90
1,150	175	55	1	30	242	93
1,150	153	41	1	38	223	96
1,220	226	59	1	30	74	91
1,210	222	80	N/A*	N/A*	423	92
1,150	156	58	0	67	259	96
1,220	210	65	1	30	212	93
1,210	203	64	1	34	123	94
1,210	218	53	3	63	322	93
1,300	192	50	1	34	202	96
1,210	224	56	181	97	412	58
975	182	54	0	36	273	94
1,220	198	53	0	41	381	86
354	246	9	N/A*	N/A*	350	74
1,200	208	46	6	N/A*	437	N/A*
1,220	219	56	1	28	406	69
N/A**	N/A**	N/A**	N/A*	N/A*	N/A*	N/A*
613	256	96	0	45	419	99

Sequential 16K Read (thousands of bytes per second) ▲	Access Time (ms) ▼	CPU Utilization (percent) ▼	Frames Dropped ▼	CPU Utilization (percent) ▼	Frames Dropped ▼	CPU Utilization (percent) ▼
1,120	187	45	1	35	244	90
1,100	165	57	6	45	408	54
1,210	214	65	1	33	244	90
1,230	164	64	1	29	185	95
1,380	212	61	0	28	250	93
1,220	215	53	N/A*	N/A*	257	94
975	201	39	1	61	420	68
1,310	202	63	1	27	184	90
1,150	154	49	0	30	193	94
1,300	212	92	1	38	421	79
976	178	45	0	48	302	95
1,320	199	63	0	46	54	90
1,150	175	55	1	30	242	93
1,150	153	41	1	38	223	96
1,220	226	59	1	30	74	91
1,210	222	80	N/A*	N/A*	423	92
1,150	156	58	0	67	259	96
1,220	210	65	1	30	212	93
1,210	203	64	1	34	123	94
1,210	218	53	3	63	322	93
1,300	192	50	1	34	202	96
1,210	224	56	181	97	412	58
975	182	54	0	36	273	94
1,220	198	53	0	41	381	86
354	246	9	N/A*	N/A*	350	74
1,200	208	46	6	N/A*	437	N/A*
1,220	219	56	1	28	406	69
N/A**	N/A**	N/A**	N/A*	N/A*	N/A*	N/A*
613	256	96	0	45	419	99

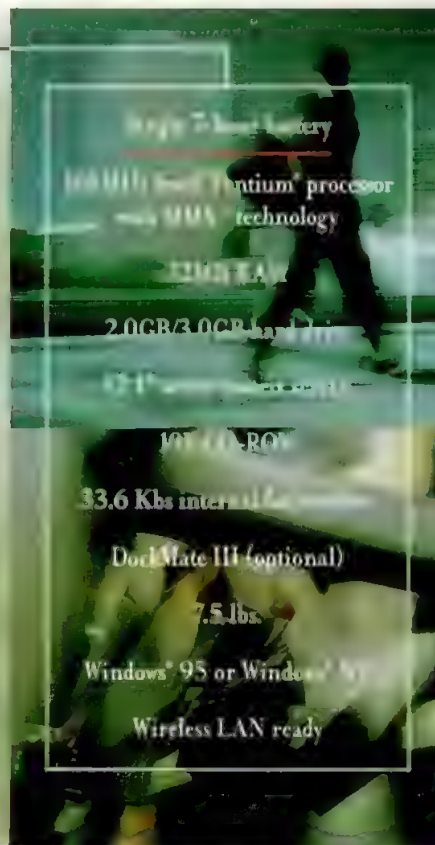
(2) With an Action, Indeo, 160 x 120, 30-fps, 300-Kbps clip (3) With an Action, Cinepak, 640 x 480, 30-fps, 900-Kbps clip.

ZD CD-ROM WinMark 97 CD-ROM WinMark 97 goes beyond the "X" specification to reflect the CD-ROM drive's performance in real life, where reading of data is not always done sequentially. The higher-rated drives generally fared better than the lower-rated versions; however, some 8X and 10X drives with faster access times outperformed 12X drives. In fact, the notebooks equipped with 10X Toshiba XM-1502B and XM-2402B drives showed up at the top of the heap in both the value and high-end categories. The Editors' Choice winners Gateway Solo 9100 S5-166 and Gateway Solo 2200 S5-133 were among 15 notebooks equipped with this elite CD-ROM drive.

ZD BatteryMark 2.0 The BatteryMark 2.0 test simulates a real user's computing habits when the machine is not attached to an AC power source. The bulk of the power draw comes from the CPU, display, and hard disk. We found that battery times have in general improved, which indicates greater power efficiency in today's notebook designs rather than increased battery capacity. Battery capacity remains unchanged from the previous generation, with the majority of battery packs still carrying about 3,500 to 3,900 mAh (milliamp-hours) rated at 10.8V or 12V.

Batteries are rated by their capacity for storing energy. The unit of energy is typically *joules*, which represent watts (a unit of power) multiplied by seconds. Watts can be further broken down to volts times amperes (a unit of current). So the total energy stored in a battery can be expressed as volts times amperes times seconds. This gives rise to the unit *volt-amp-hour*. An indication of 10 volt-amp-hours means the battery can deliver 10 volt-amps (or 10 watts) for 1 hour

Introducing the TravelMate® 7000



THE 7-HOUR *TravelMate 7000 is at home at the office or on the road. And, it has the brains to know the difference.*

With a single battery that keeps you fully-functional for 7-hours*, the Texas Instruments® TravelMate® 7000** outperforms any mobile solution in its class. Snap it into the automatically configuring DockMate™ III and you have a desktop that easily connects to all your peripherals. With cutting-edge technology, it's no wonder Acer® is the fourth largest notebook manufacturer in the world. Just look at the TravelMate 7000. You won't find anything more intelligent.

VeriTest Battery Life Results in Hours***

TravelMate 7000 (166MHz MMX)	7:26
IBM ThinkPad 760ED (133MHz)	2:38
Toshiba Tecra 720 CDT (133MHz)	2:38
Dell Latitude XPI (150MHz)	4:15
HP Omnibook 5500 CS (120MHz)	2:35



1-800-558-ACER www.acer.com/aac/

**TravelMate 7000 and DockMate III are products of Acer America Corporation, developed with Texas Instruments.

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CIRCLE 076 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/ProductLink

Road Warrior Guide



In our dreams, we casually slip a slender notebook into an uncluttered briefcase, toss in our plane tickets and a neatly typed itinerary, and take a limo to the airport. In real life, we're dealing with cords,

dongles, adapters, PC Cards, and over-stuffed shoulder bags. Here's a road warrior's guide to organizing your life before you go, and a compendium of what you'll need while you're out there.



Travelers' Checklist

These are the essentials for notebook road warriors. Fill in personal information below with a permanent marker.

CRITICAL ITEMS:

- ☐ Notebook computer.
- ☐ Notebook AC adapter and cables.
- ☐ Removable floppy disk drive, CD-ROM drive.
- ☐ Modem and connector cable (dongle).
- ☐ RJ-11 phone cord.
- ☐ International electrical and phone adapters.
- ☐ Business cards.
- ☐ Day planner and meeting schedule.
- ☐ Cash, traveler's checks, credit card, local currency.
- ☐ Tickets, itinerary, directions.
- ☐ Car and hotel confirmation numbers.

- ☐ Passport, necessary visas.

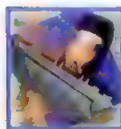
IMPORTANT TASKS:

- ☐ Charge notebook batteries.
- ☐ Change your voice mail message.
- ☐ Set up your desktop PC for remote access.
- ☐ Transfer working files to your notebook.
- ☐ Get dialing codes (for international travel).
- ☐ Get toll (non-800) phone numbers (for international travel).

OPTIONAL ITEMS:

- ☐ Spare notebook battery.
- ☐ Blank floppy disks.
- ☐ Notebook manual.
- ☐ In-line RJ-11 coupler (makes two short cords into one long cord).
- ☐ RJ-11 Y splitter (to attach two devices to one jack).

- ☐ Acoustic or handset coupler (especially for international travel).
- ☐ Spare pointing-stick cap.
- ☐ 12V DC-to-120V AC converter.
- ☐ Short printer cable.
- ☐ Three-prong-to-two-prong AC adapter.
- ☐ AC extension cord or power strip.
- ☐ Cellular phone (and charger, spare battery, car adapter).
- ☐ Pager and spare battery.
- ☐ Blank courier-service airbills, envelopes.
- ☐ Phone-line tester (checks for unsafe lines).
- ☐ Toolkit (needle-nose pliers, screwdriver, pocketknife, alligator clips, small flashlight).
- ☐ Velcro cable ties.



Before You Go

Need travel accessories? Check the following vendors for a full list of supplies, from notebook PCs to acoustic couplers.

Konexx Unlimited Systems Inc.: Hardware solutions for telephone connections. Products include acoustic couplers for telephone handsets, which let you use virtually any phone anywhere. 800-275-6354; fax, 619-550-7330; www.konexx.com.

Magellan's Catalog: Every international power and telephone/modem adapter imaginable. 800-962-4943, dept. 92; fax, 805-568-5406; www.travelocity.com.

Mobile Planet Inc.: Notebooks and accessories as well as international power adapters. 800-675-2638; fax, 818-888-3484; www.mplanet.com.

1-800-Batteries: Batteries for just about everything, as well as AC adapters and rapid chargers. Services include free recycling of spent batteries. 800-228-8374; fax, 408-879-1969; www.800batteries.com.

PC Connection: A last-minute source for hardware and software you forgot to bring. Orders received by 3:00 A.M. eastern time are delivered the same day (except Sunday). 800-800-0009; fax, 603-446-7791; www.pcconnection.com.

PC Zone: Another source for last-minute supplies and accessories. Order up to 8:00 P.M. Monday through Friday for same-day shipment. 800-408-9663; fax, 206-430-3420; www.pczone.com.

Road Warrior Outpost: A source for GPS (global positioning system) equipment, modems, memory chips, and spare batter-

ies; the company's site also lets you track your FedEx or UPS orders online. 800-274-4277, ext. 730; fax, 714-839-6282; www.warrior.com.

TeleAdapt Inc.: A source for international power and telephone/modem adapters; the company has offices in the U.S., the U.K., and Australia. 408-965-1400; fax, 408-965-1414; www.teleadapt.com.

PERSONAL INFORMATION

PHONE NUMBER E-MAIL SYSTEM

PHONE NUMBER REMOTE ACCESS

PHONE NUMBER VOICE MAIL

YOUR TRAVEL AGENT'S PHONE NUMBER

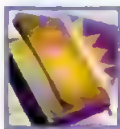
YOUR NOTEBOOK'S SERIAL NUMBER



Support Information for the Top Notebook Vendors

If you run into problems with your notebook, the best place to go for answers is the vendor that built it. Important support information for the top notebook vendors is listed here. Acer has recently acquired Texas Instruments, but not all operations have been consolidated, so we have listed information for both companies.

	Customer information	Technical support	Web address	Technical-support hours (eastern time)
Acer America Corp.	800-558-2237, 408-432-6200	800-816-2237	www.acer.com/aac	24 hours, 7 days
(Acer) Texas Instruments	800-558-2237, 408-432-6200	800-816-2237	www.acer.com/aac	24 hours, 7 days
Apple Computer Inc.	800-538-9696, 408-996-1010	800-767-2775	www.apple.com	9:00-9:00 M-F
AST Research Inc.	800-876-4278, 714-727-4141	800-727-1278	www.ast.com	24 hours, 7 days
Compaq Computer Corp.	800-345-1518, 281-370-0670	800-652-6672	www.compaq.com	24 hours, 7 days
Dell Computer Corp.	800-388-8542, 512-338-4400	800-247-9252	www.dell.com	24 hours, 7 days
Hewlett-Packard Co.	800-322-4772	970-635-1000	www.hp.com	9:00-8:00 M-F
IBM PC Co.	800-426-2968, 914-766-1900	800-772-2227	www.pc.ibm.com	24 hours, 7 days
NEC Computer Systems Division	888-306-4636, 508-264-8000	800-632-4525	www.nec-computers.com	24 hours, 7 days
Toshiba America Information Systems Inc.	800-457-7777	800-999-4273	www.computers.toshiba.com	24 hours, 7 days
WinBook Corp.	800-651-4518	800-448-0308	www.winbook.com	8:00 A.M.-9:00 P.M. M-F 9:00-4:00 Sat



The Road Warrior's Little Black Book

Need to rent a car or send an overnight package? Need to cancel a stolen credit card or a hotel reservation? Here are the essential numbers you'll need to weather any emergency or change in plans.

AUTOMOBILE RENTALS

Company	Phone number	Web address
Alamo	800-327-9633	www.freeways.com
Avis	800-331-1212	www.avis.com
Budget	800-527-0700	www.budgetrentacar.com
Dollar	800-800-4000	www.dollarcar.com
Enterprise	800-325-8007	www.pickenterprise.com
Hertz	800-654-3131	www.hertz.com
National	800-227-7368	www.nationalcar.com
Thrifty	800-331-9111	www.thrifty.com

LOST CREDIT CARDS

Company	Phone number	Web address
American Express	800-528-4800	www.americanexpress.com
Diners Club	800-234-6377	www.dinersclub.com
MasterCard	800-826-2181	www.mastercard.com
Visa	800-336-8472	www.visa.com

LODGINGS

Company	Phone number	Web address
Best Western	800-528-1234	www.bestwestern.com
Courtyard by Marriott	800-321-2211	www.courtyard.com
Doubletree	800-222-8733	www.doubletreehotels.com
Embassy Suites	800-362-2779	www.embassysuites.com
Fairmont	800-527-4727	www.fairmont.com
Four Seasons	800-332-3442	www.fourseasons.com
Hilton	800-445-8667	www.hilton.com
Holiday Inn	800-465-4329	www.holiday-inn.com
Hyatt	800-233-1234	www.hyatt.com
Inter-Continental	800-327-0200	www.interconti.com
ITT Sheraton	800-325-3535	www.sheraton.com
Marriott	800-228-9290	www.marriott.com
Meridien	800-543-4300	www.forte-hotels.com
Omni	800-843-6664	www.omnihotels.com
Radisson	800-333-3333	www.radisson.com
Ramada	800-272-6232	www.ramada-hotels.com
Resininter Group†	800-221-4542	www.hotelweb.fr
Ritz-Carlton	800-241-3333	—
Westin	800-228-3000	www.westin.com

† Manages several chains, including Novotel and Sofitel.

OVERNIGHT DELIVERY SERVICES

Company	Phone number	Web address	Your account number
Airborne Express	800-247-2676, 800-229-4685†	www.airborne-express.com	
DHL	800-225-5345	www.dhl.com	
Federal Express	800-238-5355	www.fedex.com	
UPS	800-742-5877, 800-782-7892†	www.ups.com	

† For international destinations.

TRAVEL

Carrier	Domestic information	International information	Web address
Air France	—	800-237-2747	www.airfrance.fr
Alitalia	—	800-223-5730	www.alitalia.it
American	800-433-7300	800-624-6262	www.americanair.com
Amtrak	800-872-7245	—	www.amtrak.com
ANA	—	800-235-9762	www.ana.co.jp
British Airways	—	800-247-9297	www.british-airways.com
Continental	800-525-0280	800-231-0856	www.flycontinental.com
Delta	800-221-1212	800-241-4141	www.delta-air.com
JAL	—	800-525-3663	www.jal.co.jp
Lufthansa	—	800-645-3880	www.lufthansa.com
Mexicana	—	800-531-7921	www.mexicana.com
Northwest	800-225-2525	800-447-4747	www.nwa.com
Qantas	—	800-227-4500	www.qantas.com
SAS	—	800-221-2350	www.flysas.com
Singapore	—	800-742-3333	www.singaporeair.com
Swissair	—	800-221-4750	www.swissair.com
TWA	800-221-2000	800-892-4141	www.twa.com
United	800-241-6522	800-241-6522	www.ual.com
USAir	800-428-4322	800-622-1015	www.usairways.com
Virgin Atlantic	—	800-862-8621	www.fly.virgin.com

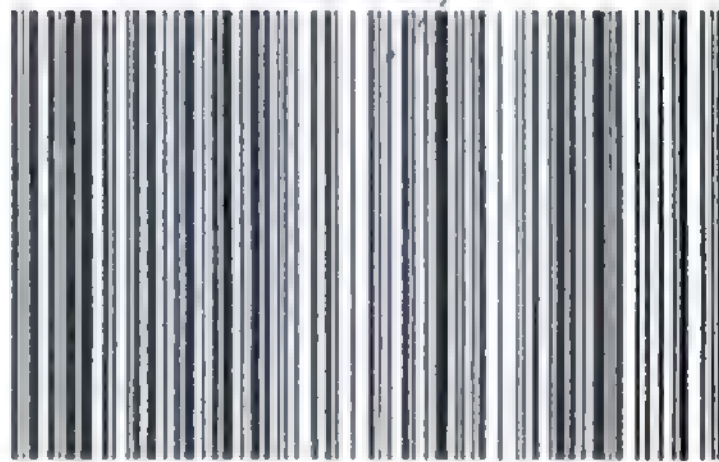
ACCESSING YOUR LONG-DISTANCE CARRIER (IN THE U.S.)

	Toll-free number	Web address
AT&T	800-225-5288	www.att.com/traveler
MCI	800-888-8000	www.mci.com/aboutyou/interests/international/travelguide
Sprint	800-877-8000	www.sprintbiz.com/dtravel

1. Follow instructions on the other side

Back

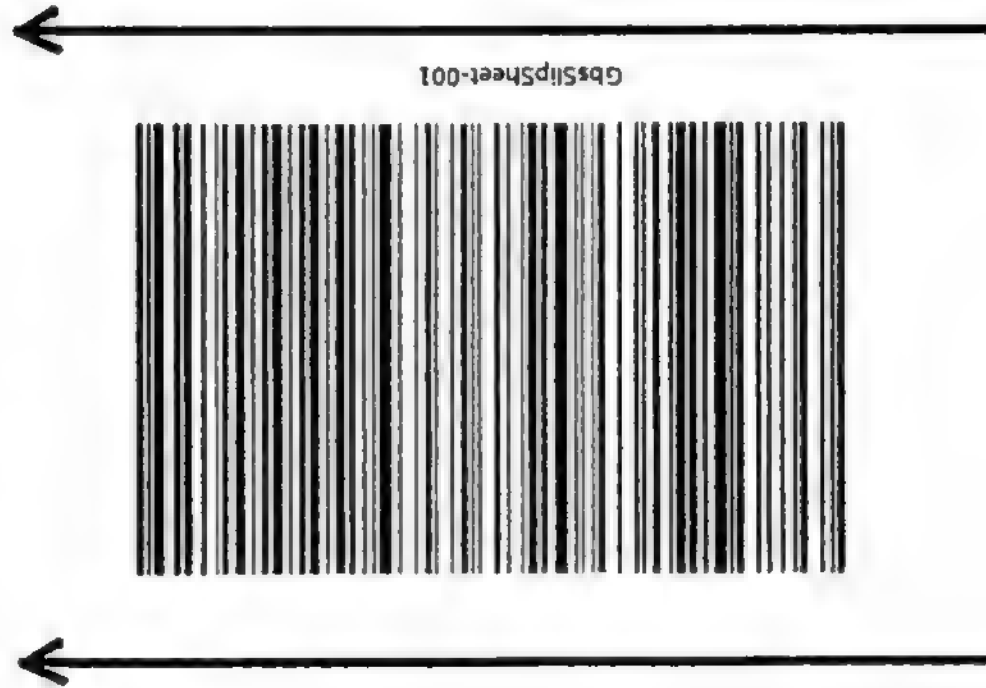
0018 Back Slip



Inverted Back

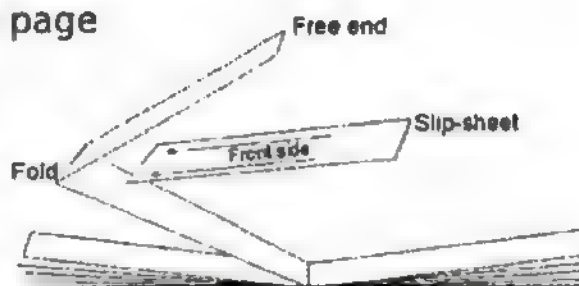
1. Follow instructions on the other side

Folded edge of the page



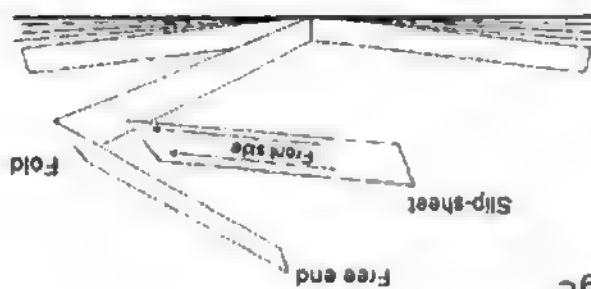
Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet





Online Services

Here's how to reach your favorite online service from the road.

	Customer service numbers	Technical-support numbers	Technical-support hours (eastern time)	Universal domestic access numbers (surcharge)	Information on local access numbers	Directions for local access numbers online
AOL	800-877-6364, 703-448-8700	888-265-8006 (Windows), 888-265-8007 (Mac)	24 hours, 7 days	800-716-0023 or 888-245-0113 (\$0.10/min.)	888-265-8005	Keyword Access
CSI (CompuServe)	800-848-8990, 614-716-2800	800-944-9871	8:00 A.M.-1:00 A.M. M-F; 10:00-10:00 Sat., Sun.	800-331-7168 (\$0.10/min. US, \$0.20/min. Canada)	800-848-8990	GO PHONES
MCI Mail	800-444-6245, 202-833-8484	800-444-6245, 202-833-8484	24 hours, 7 days	800-456-6245	800-444-6245	None available
The Microsoft Network (MSN)	800-386-5550, 813-557-0613	800-386-5550	5:00 A.M.-midnight, 7 days	None available	800-386-5550	Go to Connection Settings, MSN as Provider, Access Numbers
Prodigy Service Co.	800-776-3449	800-776-3449	24 hours, 7 days	800-777-7997 (for enrolled members only) (\$0.10/min.)	Go to Phone Directory or 800-776-3449	Go to Phone Directory Lookup, or use Dial Phone Directory connect option
SpryNet	800-557-9814, 425-957-8997	800-243-2037, 425-957-8998	8:00-9:00 M-F	800-454-8327 (\$0.10/min.)	800-244-4257	www.sprynet.com/members/ccare/local.html



ISP Information

Here is essential connection information for ten of the top ISP services.

	Nationwide toll-free number (and surcharges)	Tech-support number	Customer service number	Number of POPs	ISDN support	56-Kbps support: K56flex/x2
AT&T WorldNet	800-543-3279, \$4.50/hr.	800-967-5363	800-967-5363	225	No	No/No
Concentric Network Corp.	800-991-4227, \$5.00/hr.	800-745-2747	800-745-2747	155 plus 14 SuperPOPs	No	No/Trial support
EarthLink Network Inc.	800-853-7921, \$4.95/hr.	800-395-8410	800-395-8410	665	Yes	Yes/Yes
GTE Corp.	800-638-1483, \$4.50/hr.	800-927-3000	800-927-3000	452	Yes	No/No
IBM	800-590-4857, \$6.00/hr.	800-821-4612	800-455-5056	880	Yes	No/Yes
MCI Internet	800-779-2966, \$5.95/hr.	800-348-8011	800-550-0927 (consumer), 800-955-6505 (business)	450	Yes	No/No
MindSpring Enterprises Inc.	800-646-3603, \$7.50/hr.	800-719-4660	800-719-4664	257	Yes (in most markets)	No/Yes (in 40 markets in the Southeast)
Netcom On-Line Communication Services Inc.	800-784-3638, \$4.90/hr.	408-881-3815	408-881-3810	330	Yes (in 38 cities)	No/Yes (in California and Chicago)
Sprint Corp.	800-659-0090, \$4.80/hr.	800-786-1400	800-786-1400	220	No	No/No
SpryNet	800-454-8327, \$6.00/hr.	800-243-2037	800-557-9814	502	Yes	No/Yes



AOL and CompuServe (CSI) Access

Here are local-access numbers for major U.S. cities.

We also include ten popular international cities. Area codes are in parentheses. Connection speeds vary.

	AOL	CSI		AOL	CSI		AOL	CSI
Atlanta (404)	893-5000	841-0578	Miami (305)	913-0009	262-9325	Amsterdam (20)	682-6015	688-0085
Austin (512)	929-0721	326-1155	Minneapolis (612)	798-7900	339-1805	Brussels (2)	705-2380	726-8830
Baltimore (410)	727-1209	494-8403	New York (212)	238-4340	766-2080			646-9070
Boston (617)	369-0200	426-9295	Philadelphia (215)	569-7303	561-1634	Frankfurt (69)	2970-5300	7399-8611
Chicago (312)	552-9010	201-0711	Phoenix (602)	651-2480	468-0285	Hong Kong (852)	2519-9040	3002-8332
Cleveland (216)	230-4000	781-7598	Pittsburgh (412)	394-2260	471-6417	London (171)	572-7444	570-5000
Dallas (214)	220-9100	720-9183	Portland (503)	224-7298	274-6400	Mexico City (5)	628-9393	262-0000
Denver (303)	360-0300	595-0123	St. Louis (314)	991-0969	421-5651	Paris (14)	747-1564	188-0840
Detroit (313)	225-4108	535-1466	San Diego (619)	277-9909	460-9508			102-0304
Honolulu (808)	934-0035	528-0430	San Francisco (415)	546-1457	434-1586	Singapore (65)	545-4734	438-4121*
Houston (713)	224-9700	650-5143	San Jose (408)	280-1300	980-1044			738-0566**
Las Vegas (702)	457-4570	796-4877	Seattle (206)	812-1916	515-6000	Tokyo (3)	3589-7011	5471-7650
Los Angeles (213)	625-8542	624-3730	Washington (202)	222-1619	541-0103	Toronto (416)	364-3400	367-8122

* Connection through WorldNet, change the network provider name under the Access/Preferences/Network picklist.

** Connection through Sprintnet, change the network provider name under the Access/Preferences/Network picklist.



Missed Manners? Here are the basics on restaurant dining. The bread plate is on your left; glasses and coffee cup are on your right. Select knives and forks from the outside in as each course is served—with a couple of exceptions. The dessert spoon and fork are often located above the plate, while the butter knife is found across the bread plate. Signal your server that you've finished eating by placing your fork and knife (prongs down and blade facing in, respectively) side by side at the four o'clock position.



TRAVEL TIPS FOR CONNECTING ON THE ROAD

Moving data from point A to point B while you're on the road can be far tougher than moving yourself. Here are some tips to make data connections easier.

Disable Call Waiting Data transfers can be cut off by call waiting. Dial *70 (or 1170 from a rotary phone) to disable Call Waiting for the next call. If *70 doesn't work, try #70, 70#, or 70*.

Cellular connections Modems must support cellular error-correction protocols such as MNP10 or TxCel. Initialize your modem using the string AT&F1*H0 S69=15 S70=20 W2. Most cellular carriers let you connect to your provider's modem bank by dialing *3282 (*DATA). The AT&F command restores your modem to its factory-set default configuration.

Printing Install popular printer drivers on your notebook (such as those for the HP LaserJet and DeskJet and the Epson dot matrix printers, along with a generic "text-only" driver). The Web sites for HP (www.hp.com) and Microsoft (www.microsoft.com) offer downloadable

printer drivers. Or use your fax modem to "print" to a fax machine.

Data transfer in the air Many airlines offer GTE's Airfone (800-247-3663; www.gteairfone.com) or AT&T Wireless Services (800-247-6636; www.attws.com) phones. Both support data and fax transfers. Cost is about \$3 for setup, then \$3 per minute for domestic calls. International calls cost \$5 for setup and \$5 per minute.

Data transfer at the airport AT&T's Public Phone 2000, available at many airports, offers a full-size keyboard, a color video display, an RJ-11 phone jack, and a credit card slot. Follow posted data-transfer instructions exactly. You may have to dial manually using the phone keypad.

In-line handset coupler This device lets you connect to the handset jack (as opposed to the wall RJ-11 jack) on any phone, includ-

ing digital PBX phones. This avoids the damage that can be caused by plugging a PC Card modem into a digital phone jack.

Long-distance carrier codes Dial one of these six-digit prefixes before the area code and phone number in order to use the following long-distance services:

AT&T: 102880

MCI: 102220

Sprint: 103330

Security tips

- Don't lose sight of your notebook case as it goes through the X-ray machine at airport security.
- Use the motion-sensing Defcon 1 notebook alarm (\$49.95 direct; Port Inc., 800-242-3133) to protect your computer.
- Use a Kensington MicroSaver lock (\$74.95 list; 800-535-4242) or a similar device to secure your notebook to a desk.
- Tape business cards or address labels to your notebook and AC adapter.
- Use your notebook's password-protection utility to provide a layer of protection for your data.
- Always shield public phone keypads to protect your calling card number.



TOP WEB SITES FOR BUSINESS TRAVELERS

The following Web sites offer information of special interest to business travelers, from news and weather to travel reservations and currency conversion.

GENERAL-INTEREST AND NEWS SITES

www.cnn.com CNN. News, sports, business, and weather coverage.

www.nytimes.com *The New York Times*. News, weather, sports, features.

www.pcmag.com *PC Magazine*. Product reviews and technology updates; top 100 Web site ratings, and daily reports on high-tech news.

travel.state.gov U.S. Department of State. World travel warnings and advisories.

www.wsj.com *The Wall Street Journal*. News, stocks, company profiles. Requires subscription.

www.usatoday.com *USA Today*. News, sports, business, weather, features.

WEATHER

www.intellicast.com Intellicast. Weather site linked to NBC for U.S. and foreign weather.

www.weather.com The Weather Channel.

ONLINE RESERVATIONS

www.thetrip.com Air travel reservations, flight status information, hotel listings and

reviews, city guides, travel tips, and interactive maps.

www.travelocity.com Airline and hotel reservations, listings of local attractions, late-breaking discounts, and live chat for travelers.

www.travelweb.com Airline reservations, hotel searches and reservations, and links to travel resources.

SPECIALIZED SITES

www.city.net Extensive guide to more than 5,000 cities worldwide.

www.citysearch.com CitySearch. Detailed information on a handful of U.S. cities.

www.krollassociates.com Kroll Travel Watch. Sample travel advisories for cities worldwide. Full advisories by fax for \$9.95.

www.mapquest.com Interactive U.S. route maker for automobile travel; also offers an interactive world atlas and personal map maker.

www.rubicon.com/passport.html Rubicon Digital Passport. Interactive

currency converter; listings of international holidays, embassies, airports, and airlines.

www.supporthelp.com Provides information on technical-support phone numbers, Web sites, newsgroups, and bulletin boards for more than 2,500 vendors of computer products.

metro.jussieu.fr:10001/bin/cities/english Guide to world subway systems that even computes routes and travel times.

www.travelstuff.com/plglist.html Travelers Emporium. Online list of international electrical/telephone plug and power standards.

www.travelersaid.org Travelers Aid International. Lists Travelers Aid program contact information for U.S. and some foreign cities.

PHONE DIRECTORIES

www.bigyellow.com Big Yellow.

www.four11.com Four11.

www.switchboard.com Switchboard.

www.whowhere.com WhoWhere?

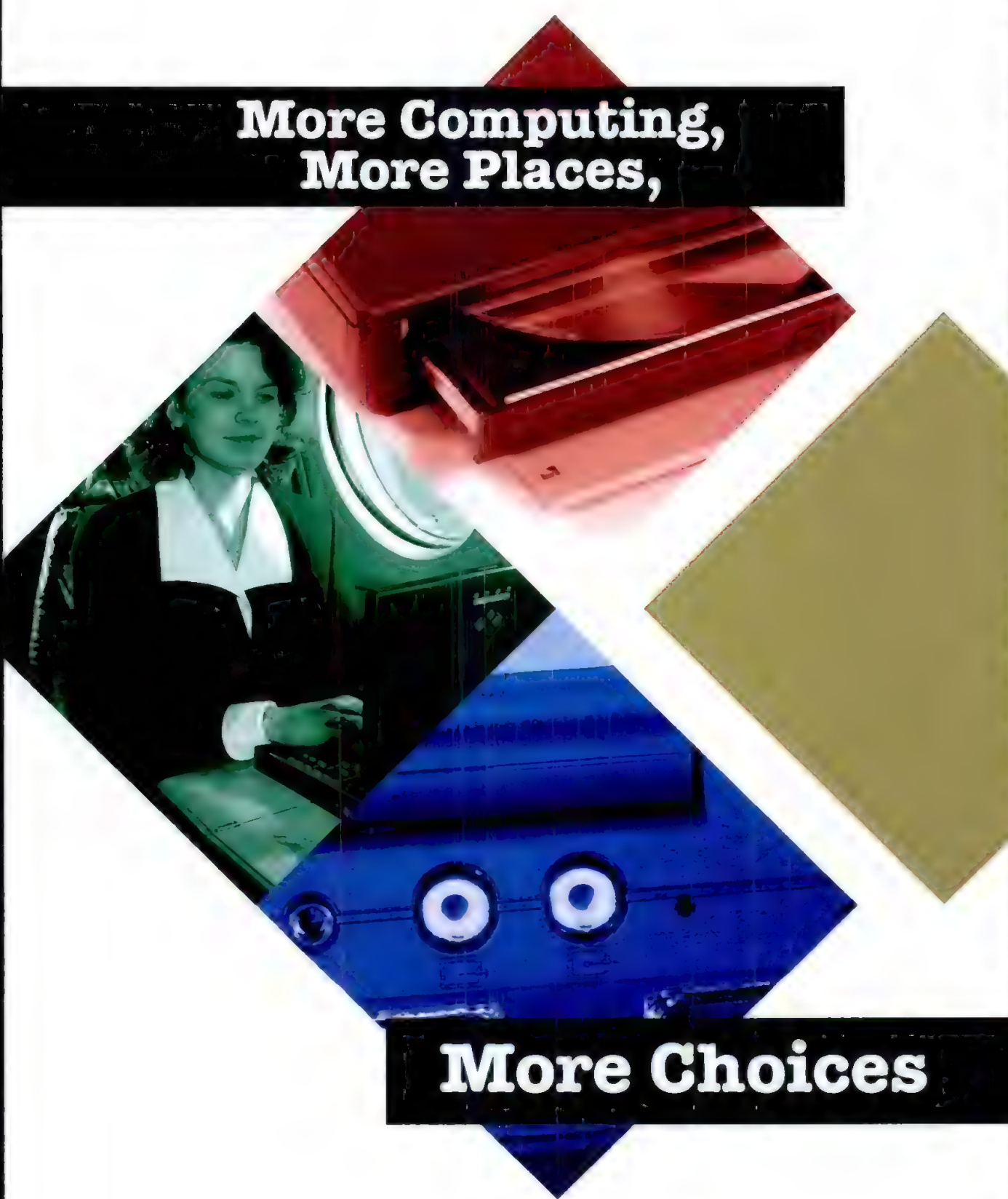
WEB SEARCH ENGINES

www.altavista.digital.com Alta Vista

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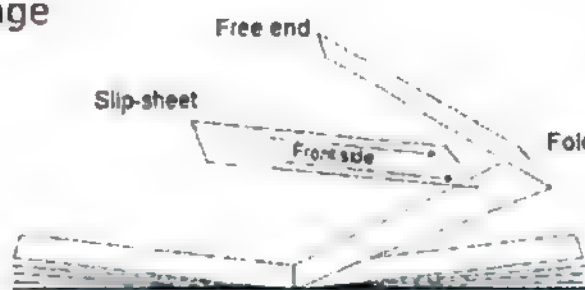
Whether you're outfitting the fleet or looking for a power PC that can handle the desktop as easily as the tray table, you'll find a family of portable PCs at Gateway 2000. ♦ The Gateway Solo™ 9100 notebook includes the features of a desktop in a PC that's at home on the road. ♦ The 9100's 13.3-inch diagonal screen is comparable to the viewing area of many 15-inch monitors and features next-generation XGA LCD display technology. An Intel Pentium® processor with MMX™ technology, combination CD-ROM/floppy drive and high-performance video chip set deliver desktop power in a portable package. ♦ Need an affordable complement to your desktop PC? The new Gateway Solo 2300 notebooks offer things like a 12.1-inch display, 12-cell lithium ion battery and MMX technology — plenty of power and performance to handle all your road work. ♦ No matter what model you pick, you decide what goes into your Gateway Solo portable. Your sales representative will go over your component options and you make the decisions. ♦ We've also increased the flexibility of our portables by designing "common modularity" of some components into the Gateway Solo 2300 and the premium 9100 notebook. That means Walker in sales can easily trade some things like the battery, AC adapter and memory from his Gateway Solo 2300 notebook with those from O'Brien's 9100 portable in marketing, and IS can buy one set of components and docking stations to supply everyone. ♦ No matter what your needs, the choice is black and white — Gateway 2000. Call us for more computing, more places, *more choices*.



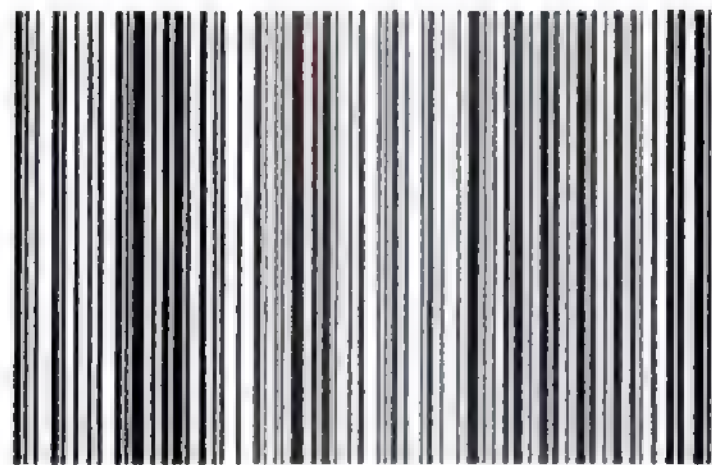
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www.gateway.com

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



Inverted Foldout slip-sheet

Folded edge of the page

1. Open the foldout page

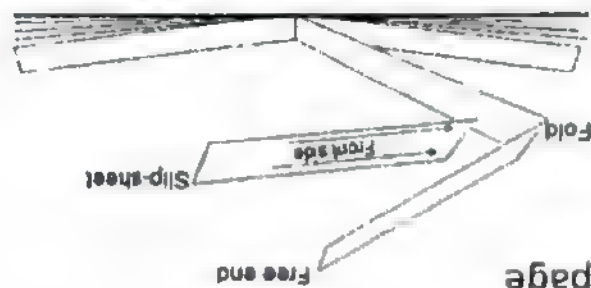
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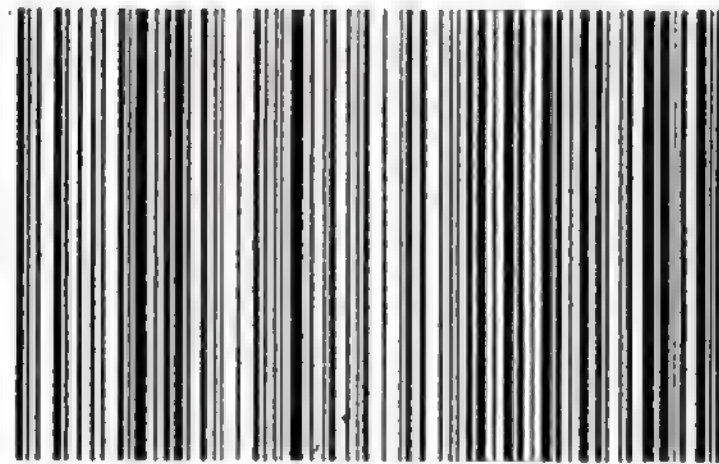
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs5lipBack-0018

Back

1. Follow instructions on the other side

Experi

Gateway Solo 9100 Portable

13.3-inch
XGA active
matrix TFT
display

4MB video
RAM standard

SDRAM (memory)
expandable to 192MB

Hard drive
capacity
up to 3GB

Modular combination
CD-ROM and floppy drive

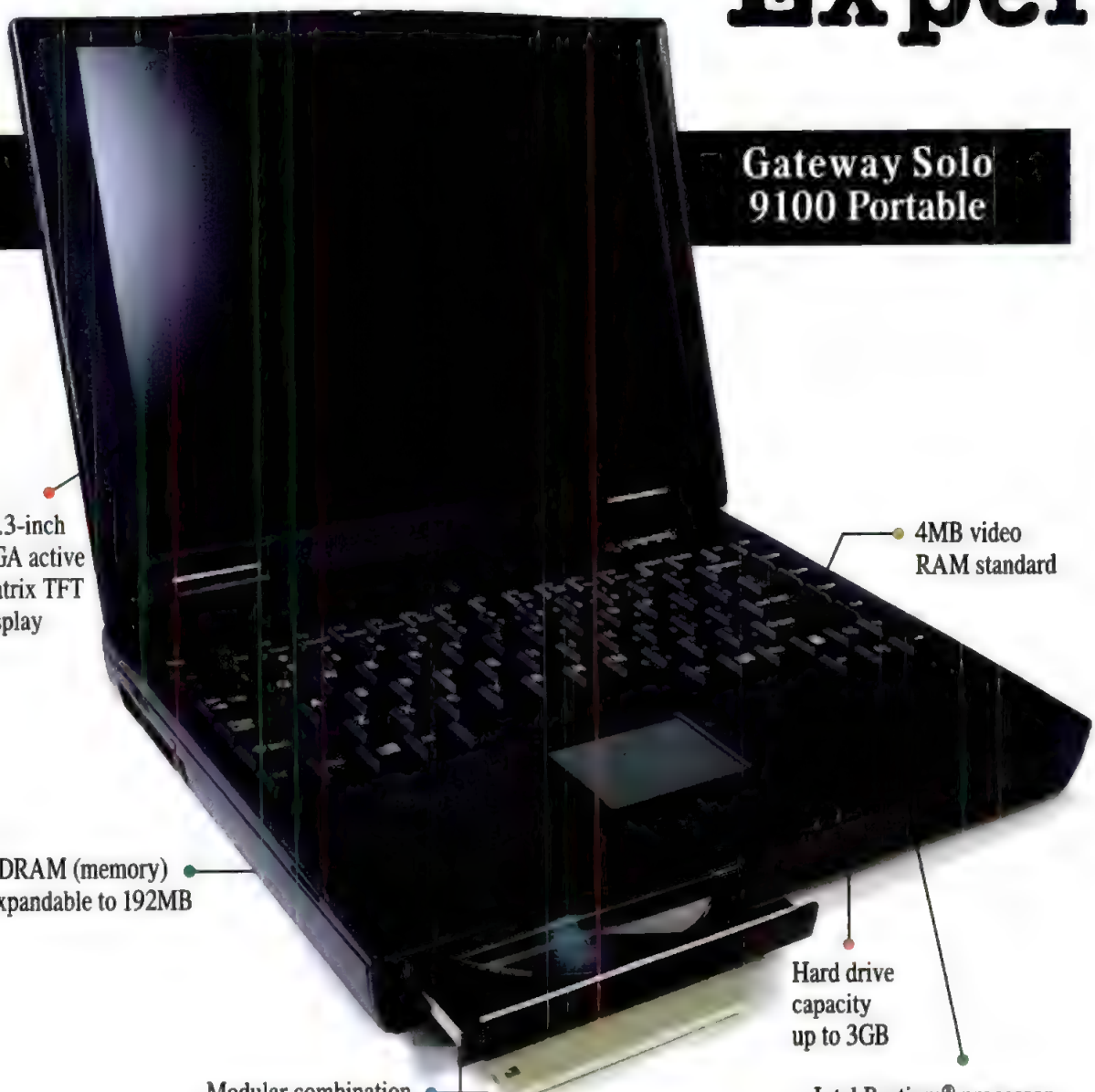
Intel Pentium® processor
with MMX™ technology

NTSC/PAL video input/output
for video receiving *and* displaying
capabilities

Dual USB
ports standard

MIDI/joystick port

Fast infrared



Gateway Solo™ Portable PCs ... More Choices

2100SE

- 11.3" SVGA Dual Scan Color Display
- Intel® 120MHz Pentium® Processor
- 16MB EDO RAM (expandable to 72MB)
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- USB & Zoomed Video Ports
- 1GB Hard Drive
- Modular 3.5" Diskette Drive
- Modular 6X min/11X max CD-ROM Drive
- 16-Bit Sound w/ Stereo Speakers
- NiMH Battery & AC Pack
- 85-Key MS® Windows® 95 Keyboard
- EZ Pad® Pointing Device
- Casual Carrying Case
- Microsoft® Windows 95
- MS® Works 95
- Gateway Gold™ Service and Support for Portable PCs

\$1899 Business Lease* \$74/mo.

2200SE

- 12.1" SVGA TFT Color Display
- Intel 133MHz Pentium Processor
- 16MB SDRAM (expandable to 80MB)
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- USB & Zoomed Video Ports
- NTSC/PAL Video Output
- 1.3GB Hard Drive
- Modular 3.5" Diskette Drive
- Modular 6X min/11X max CD-ROM Drive
- 16-Bit Wavetable Sound w/ Stereo Speakers
- 8-Cell NiMH Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Casual Carrying Case
- MS Windows 95
- MS Works 95
- Gateway Gold Service and Support for Portable PCs

\$2599 Business Lease* \$92/mo.

2200LS

- 12.1" SVGA TFT Color Display
- Intel 166MHz Pentium® Processor with MMX™ Technology
- 32MB EDO RAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- USB & Zoomed Video Ports
- NTSC/PAL Video Output
- 2GB Hard Drive
- Modular 3.5" Diskette Drive
- Modular 6X min/11X max CD-ROM Drive
- 16-Bit Wavetable Sound w/ Stereo Speakers
- 12-Cell Lithium Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Casual Carrying Case
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold Service and Support for Portable PCs

\$3549 Business Lease* \$140/mo.

2300LS

- 12.1" SVGA TFT Color Display
- Intel 150MHz Pentium Processor with MMX Technology
- 32MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 1MB EDO Video RAM
- USB & Zoomed Video Ports
- NTSC/PAL Video Output
- 2GB Hard Drive
- Modular 3.5" Diskette Drive
- Modular 6X min/11X max CD-ROM Drive
- 16-Bit Wavetable Sound w/ Stereo Speakers
- 33.6 PCMCIA Data™/14.4 Fax Modem
- 12-Cell Lithium Ion Battery & AC Pack
- 85-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Casual Carrying Case
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold Service and Support for Portable PCs

\$3899 Business Lease* \$132/mo.

9100XL

- 13.3" XGA TFT Color Display
- Intel 166MHz Pentium Processor with MMX Technology
- 64MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- 4MB Video RAM
- USB and Zoomed Video Ports
- NTSC/PAL Video Input And Output
- 3GB Hard Drive
- Modular Combo 6X min/11X max CD-ROM Drive & 3.5" Diskette Drive
- 16-Bit Wavetable Sound w/ Stereo Speakers
- 33.6 PCMCIA Modem with x2™ Technology™
- Two 12-Cell Lithium Ion Batteries & AC Pack
- 88-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Deluxe Carrying Case
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service and Support for Portable PCs

\$5999 Business Lease* \$215/mo.

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- 2300 NiMH Battery Option \$125
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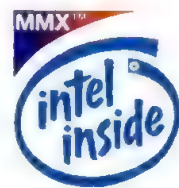


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BENCHMARK TESTS

in a DC circuit. A volt-amp-hour is equivalent to 1,000 millivolt-amp-hours. In small notebook batteries, the rating is divided into two parts: volts and amp-hours. For example, a notebook battery may have a rating of 3,500 mAh, 12V. This means the battery can effectively deliver 3,500 milliamps for 1 hour in a 12V DC circuit.

In this roundup, almost all of the notebooks, even in the value line, used lithium ion batteries, which have more charge/discharge cycles and pack more energy per unit of weight than the cheaper nickel hydride variety.

Equipped with a high-capacity (5,400-mAh, 10.8V) battery and a heuristic battery-management technology that adjusts the power management strategy according to usage, the (Acer) Texas Instruments TravelMate 7060 lasted 6:43 on the BatteryMark 2.0 test. The Micron TransPort XKE, also powered by an extraordinarily large 5,400-mAh, 10.8V battery, kept going for over 4 hours. The best of the value notebooks, the AcerNote Light 383, lasted about 4 hours, and the top subnotebook was the Compaq Armada 4131T, at 2:29. The efficiency champions were the Compaq Armada 7750MT and the Dell Latitude XPi CD M166ST. With only 2,700- and 2,500-mAh, 14.4V batteries respectively, both notebooks surpassed the 3-hour mark. We calculated their average power dissipation during our test to be less than 12 watts, compared with the average of 23 watts.—*Analysis written by S. Jae Yang*

How We Tested

We divided our tested notebooks into three categories: high-end, value, and subnotebook. High-end systems had 150-MHz or faster Pentium MMX processors, 2GB or larger hard disks, and 32MB of RAM. We required the value notebooks to have 133-MHz or faster Pentium processors, 1GB or larger hard disks, and 16MB of RAM. Subnotebooks needed to have 16MB of RAM and system weights of 5 pounds or less (system weight does not include removable modules such as CD-ROM drives, floppy disk drives, or AC adapters and cords). We used each vendor's preinstalled graphics driver for the notebook's maximum internal resolution with 256 colors and small fonts. For benchmark tests, we also disabled power management features and removed unnecessary drivers. We defragmented hard disks before each test run and let Windows 95 manage virtual memory settings.

We used our **ZD Winstone 97, Version 1.0**, benchmark test suite to measure the machines' performance when running 32-bit Windows 95 applications. Winstone 97 is divided into two categories: **ZD Business Winstone 97**, focusing on mainstream applications, and **ZD High-End Winstone 97**, which emphasizes CPU and graphics-intensive applications. In this roundup, we ran only our Business Winstone tests, which measure the time a PC takes to execute a set of application scripts that exercise eight of the best-selling Windows 95 applications. Business Winstone weights a given PC's test timings based on the applications' unit market shares; it derives a composite number and converts it to a relative score. (The score is relative to the performance of a Gateway 486DX2/66 with 16MB of RAM, whose score is defined as 10.)

ZD WinBench 97, Version 1.1, measures graphics, disk, processor, CD-ROM, and motion-video performance under Windows 95. Version 1.1 incorporates updates to Disk WinMark 97 and the video tests. Disk WinMark 97 was updated to address Microsoft's changes to the buffer flush routines in OSR2. The video tests now utilize the new ActiveMovie media control

architecture, which Microsoft distributed through OSR2 and Internet Explorer 3.0. Like our Winstone test suite, **ZD Graphics WinMark 97** and **ZD Disk WinMark 97** are divided into Business and High-End sections. In this roundup, we ran only the Business portion of these suites.

The **ZD Business Graphics WinMark 97** score, a number based on a log of GDI operations used in the Business Winstone 97 suite, represents the performance of each machine's graphics subsystem under Windows 95. Scores are normalized to reflect performance relative to the base system used for Business Winstone testing. We include information about maximum screen resolution in our results for these tests because pixel loads are higher at 1,024-by-768 than at 800-by-600 resolution and cause significant differences in scores; comparisons should be made among systems with the same resolution. The **ZD Business Disk WinMark 97** score, based on a log of disk functions used in the Business Winstone suite, represents the performance of each machine's disk subsystem under Windows 95. Results are reported in thousands of bytes per second and then converted to a harmonic mean weighted in the same way as the Business Winstone results.

The **ZD CPUmark₃₂** scores reflect the speed of a PC's processor subsystem—which includes the CPU, secondary cache, and system RAM—under a 32-bit operating system. The CPUmark tests emulate the CPU activity of real-world applications.

The **ZD CD-ROM WinMark 97** tests gauge the performance of each machine's CD-ROM subsystem, which includes the CD-ROM drive, its adapter, and its required software drivers. The tests are based on a profile of six of today's most popular Windows CD-ROMs. We report the results of the CD-ROM **Sequential 16K Read** test, which measures the throughput of a CD-ROM subsystem as it reads 16K blocks of data on a CD-ROM. The CD-ROM **Access Time** score measures CD-ROM drive performance as it randomly accesses 2K blocks from the entire CD-ROM. The CD-ROM **CPU Utilization** score represents the percentage of the CPU's bandwidth occupied in servicing the CD-ROM subsystem as it retrieves data. To determine the utilization, WinBench 97 uses a default block size of 16K. The transfer rate defaults to the maximum rate of the particular CD-ROM subsystem. WinBench 97 then calculates this transfer rate before it runs the actual test.

WinBench 97 also includes a suite of video tests that measure a PC's ability to play full-motion .AVI files. We test video-playback performance with two types of clips at a variety of data and frame rates, using either an Indeo or a Cinepak codec. We report results from the **Full-Screen Scaling** test, which uses the Action Indeo, 160-by-120, 30-frame-per-second, 300-KBps clip, and the **High-Quality Action Cinepak** test, which uses a Cinepak, 640-by-480, 30-fps, 900-KBps video clip. For both sets of tests, we report Frames Dropped and CPU Utilization.

Our **ZD BatteryMark 2.0** test measures a notebook's battery life by exercising three different 32-bit software workload engines, one each for processor, disk, and graphics tasks. BatteryMark mixes these workloads together and adds periodic *think times*, or breaks, in the work that reflect the way users pause while working. We use standard power management settings during testing: 2 minutes for hard disk time-out (or the closest value available) and Auto or Fast CPU speed. Although display time-out is set to 30 seconds, our tests keep the screen active throughout. BatteryMark also uses Microsoft Advanced Power Management where possible to automate procedures and provide information.

Ends

The Brick Computer Co.

Ergo CD-PowerBrick³

The Brick Computer Co.'s Ergo CD-PowerBrick³ (\$3,795 direct) delivers a good set of components and a generous warranty. Its only drawback is an awkward case design. It is similar to the ACT NM5120VX and the MaxTech Yes-Book Model 753Plus.

The Ergo comes with a 2GB Toshiba hard disk and a built-in 8X TEAC CD-ROM drive. Graphics are driven by a NeoMagic graphics chip set with 1MB of SGRAM, which helped the unit land an above-average score on our Graphics WinMark test. All other benchmark test scores were average.

Built around a 200-MHz Pentium MMX processor and a 12.1-inch TFT screen, the Ergo boasts a travel weight of 8.2 pounds and includes a 33.6/14.4-Kbps modem that doubles as an Ethernet adapter. The machine also has a lithium ion battery, which lasted a disappointing 1:11 on our test.

We found that the unusually shallow keyboard and its less-than-responsive keys invite typos. The touch pad buttons are small and oddly shaped, and the component bay lids are hinged and feel a bit flimsy. Brick includes a generous four-year warranty through Philips/Magnavox and provides guaranteed 24-hour turn-around in the event of malfunction. Overall, the Ergo CD-PowerBrick³ has a sensible and well-supported bundle of components, but its oddly conceived overall design may dissuade some buyers.—Joshua Levy

Ergo CD-PowerBrick³. Direct price: \$3,795. The Brick Computer Co., Peabody, MA; 800-495-3746, 508-535-7510; fax, 508-535-7512; www.ergo-computing.com. Circle 463 on reader service card.

Broadax Systems Inc.

Broadax XGA-1330, Broadax NP6280A

The Broadax XGA-1330 (\$4,598 direct) surrounds a desktop processor with several high-end components. The vendor's other offering, the Broadax NP6280A, was a leading performer in our value category, but at \$3,480 (direct) it is more expensive than many of its peers.



Brick Ergo CD-PowerBrick³, ChemBook 6800, Broadax XGA-1330.

Built around a 200-MHz MMX desktop Pentium, the XGA-1330 runs rather hot and has a noisy CPU fan. It posted an above-average CPUmark score and an average Winstone score, but its other benchmark test results were below average.

Weighing 8 pounds (travel weight), this notebook contains a modular bay that supports either a CD-ROM drive, an included floppy disk drive, or an optional second battery (\$200). Broadax also includes a 33.6-Kbps internal modem, a parallel-port cable for external use of the floppy disk drive, and an NTSC video-in port.

Like the XGA-1330, the NP6280A has a 200-MHz MMX desktop Pentium processor. Relative to the scores of the other value notebooks, all of the NP6280A's test scores were above average except for an average Disk WinMark score. In addition to the

CPU—the only 200-MHz chip in our value category—prime components include a Trident Graphics chip set (2MB DRAM) and 12X TEAC CD-ROM drive.

The NP6280A weighs in at a hefty 9.4-pound travel weight. Its CD-ROM is integrated, but the chassis offers a modular bay that accommodates either a floppy disk drive or a second battery. The unit also has two rear plastic feet, an NTSC video-out port, and a MIDI port.

The XGA-1330 is similar to the AMS TravelPro 2010CX and All Computer Technology's ACT NA5130PX; the NP6280A is similar to the ChemBook 6800 and the Fosa AP 6320T.

Although both units showed competent performance on our benchmark tests, they are burdened by short battery life: The XGA-1330 ran for only 1:13 and the NP6280A for 1:31 on

our BatteryMark test.—CM

Broadax XGA-1330. Direct price: \$4,598. **Broadax NP6280A.** Direct price: \$3,480. Broadax Systems Inc., El Monte, CA; 800-872-4547, 818-442-0020; fax, 818-442-4527; www.bsicomputer.com. Circle 464 on reader service card.

Chem USA Corp.

ChemBook 6800

In the value category, Chem USA Corp. offers the ChemBook 6800 for a direct price of \$2,580. Despite a hefty travel weight of 9.2 pounds, the unit has many compelling features that, combined with the low price, make it worth considering.

The ChemBook 6800 is multimedia-ready: Its 12.1-inch TFT screen provides a clear picture and can handle simultaneous display for presentations, although the refresh rate for an external monitor is only 60 Hz. The 8X CD-ROM drive is built-in, and the unit offers a regular monitor adapter and a TV jack. The sound system has FM and

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Brick Ergo CD-PowerBrick ³	Good	Good
Broadax XGA-1330	Good	Good
Broadax NP6280A	Good	Fair
ChemBook 6800	Fair	Fair

It's a No Brainer.



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- B. It's technologically, the state-of-the-state-of-the-art.
- C. Its components are made by the best of the best.
- D. It's got 7-day, 24-hour technical support from live human beings.
- E. It's been commended and recommended by all the trade books.
- F. It has a loyal following that swear by it - not at it.
- G. And, here's the kicker. It actually costs less!

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Consider Anything Else?



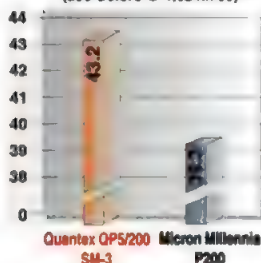
Choosing the right PC is as easy

A.

Top-Rated Performance

Quantex systems aren't just built to perform, they're built to out-perform. We're always raising the bar on standards a notch or two. We engineer our systems to the Nth degree and put everything through the toughest quality control tests. Just some of the reasons why Quantex PCs always put on a great performance.

Business Winstone 97
(256 Colors @ 1,024x768)



Source: Computer Shopper Benchmarks

B.

Cutting-Edge Technology

If it's the newest, the fastest, or the most innovative development, you can bet Quantex will be one

☒ **Pentium® II Processor**

☒ **K56 Flex Modem**

☒ **DVD**

of the first to have it. We pride ourselves on being a leader, not a follower. Being among the first to incorporate the Pentium® II processor, K56flex modems and DVD into our systems are just a few examples of this forward thinking.

C.

Brand-Name Components

Look inside any Quantex PC and you'll see lots of names you recognize. That's because we only use components made by the undisputed leaders in the PC industry. The best of the best! Why are we so fussy? Simple. At Quantex, we know a PC is only as good as the sum of its parts.

Windows Magazine, 6/97

"Peek inside the QPS/200 SM-2's mini-tower case and you will find (it) filled with wall-to-wall name-brand peripherals."

D.

Living, Breathing 24-hour support

We provide expert technical support 24 hours a day, 7-days a week. Talk to real-live people who will solve your problem - not a frustrating know-nothing recording. On top of that, over 95% of incoming calls are answered in less than three minutes.

PC World, 5/97

"Quantex provides important benefits like (all)-weekend support"



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as A, B, C, D, E, F, G.

E.

Highly Acclaimed

Read any good PC trade magazines lately? Well, if you have, you can't



help but notice the way Quantex keeps getting great reviews on its systems and lots of "thumbs up" from the trade press. Quantex has received over 10 PC World Best Buy awards and has been on PC World's Top 20 list over 61 times in the past 12 months. But don't think we're sitting on our laurels. These awards only spur us on to earn even more!

F.

Loyal Following

If you really want to know how good a Quantex PC is, check out the number of buyers who come back to buy from us a second time. And a third time. No one has a more loyal following than Quantex. For the past decade, we've sold hundreds of thousands of PC's into homes and businesses and the vast majority of customers have expressed their total satisfaction in the best way possible. By coming back for more.

PC World, 8/97

In a recent PC Reliability and Service report, over 80% of respondents who own Quantex systems would buy from Quantex again.

G.

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- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- Matrox Millennium 3D w/8MB WRAM
- 17" Digital Monitor (16.1" viewable)
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- Ensoniq 32-Bit Wavetable Sound Card
- Altec Lansing ACS-45 Speakers w/subwoofer
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- 104-Key Keyboard With MS IntelliMouse
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- 6.4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- Matrox Millennium 3D w/4MB WRAM
- 17" Digital Monitor (16.1" viewable)
- K56flex™ protocol Fax/Modem w/Voice Mail and Speakerphone
- 24X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec Lansing ACS-45 Speakers w/subwoofer
- ATX Case
- 104-Key Keyboard With MS IntelliMouse
- MS Windows '95 With MS Plus
- MS Office 97 Small Business Edition
- 3 year limited warranty 24 hr / 7-day Technical Support

QP6/266 SM-3x (featuring Pentium® II Processor).....\$2699
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QP6/266 WS-3x **\$2549** Business lease: \$89/Mo.
(featuring the Pentium® II Processor)

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- 32MB EDO Memory / 512KB Secondary Cache
- 4GB EIDE Mode 4 HD / 3.5" 1.44MB Floppy Drive
- Matrox Millennium 3D w/4MB WRAM
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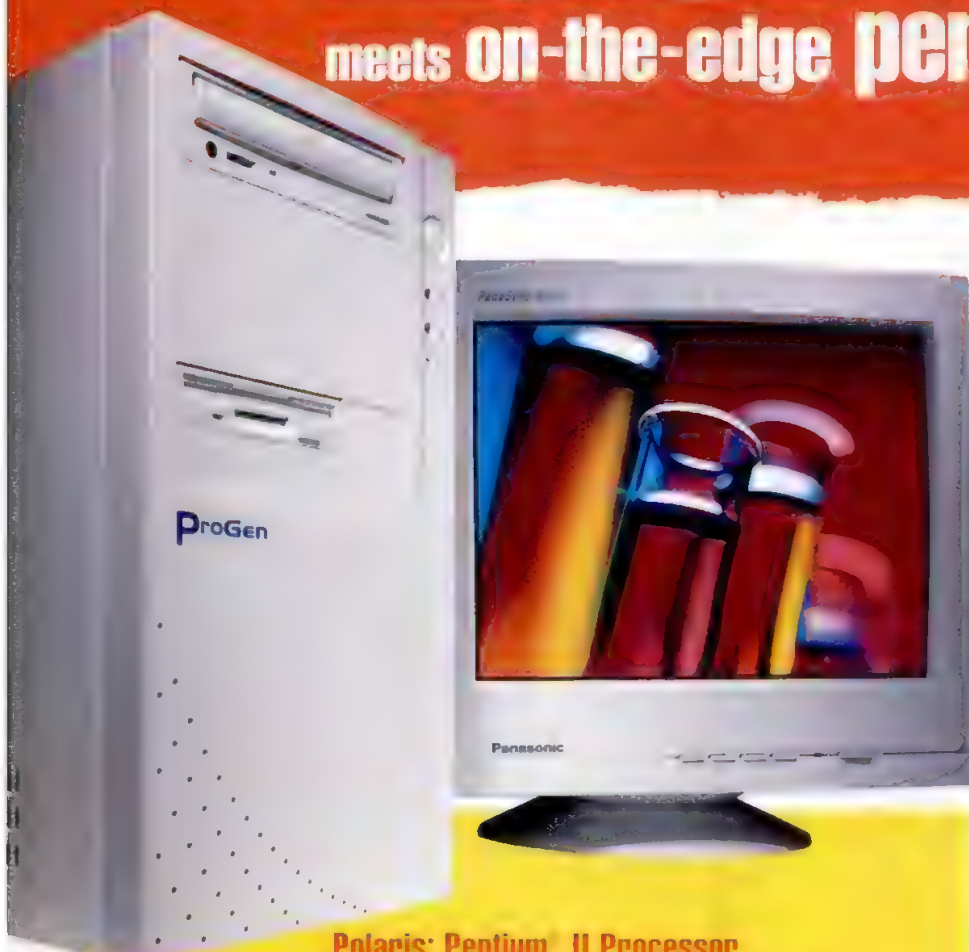
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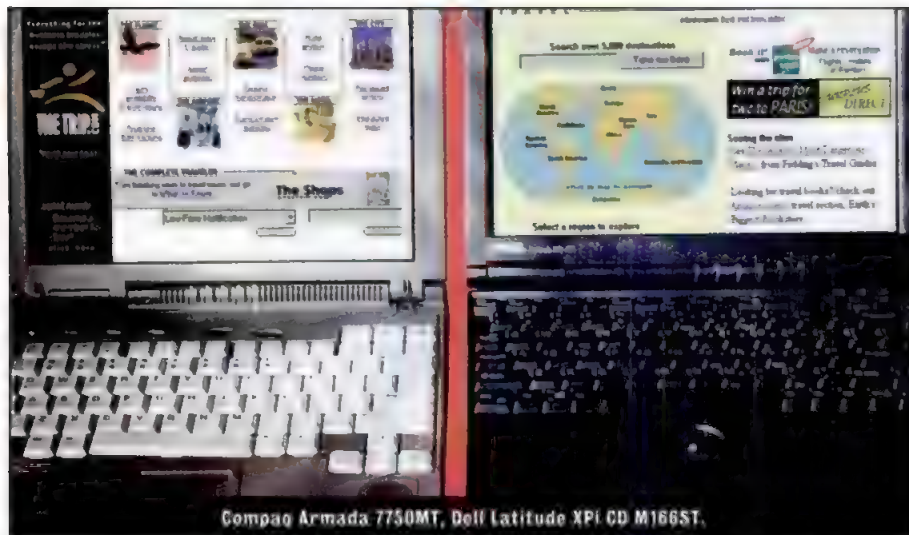
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wavetable synthesis, but the dual speakers produce tinny sound. Users may also want to upgrade the 1GB hard disk, which slides out easily. The unit's performance scores were all average.

The ChemBook lasted a below-average 1:32 on our BatteryMark test, but its floppy disk drive bay can accommodate a second battery. The unit can handle up to three PC Cards simultaneously. It is similar to the Broadax NP6280A and the Fosa AP 6320T.

The company promises a 48-hour turnaround for problem units. An attractive price and some good features make this worthy of a second look.—*Frank J. Evans*
ChemBook 6800. Direct price: \$2,580. Chem USA Corp., Newark, CA; 800-866-2436, 510-608-8818; fax, 510-608-8828; www.chemusa.com. Circle 465 on reader service card.

Compaq Computer Corp. **Armada 7750MT, Armada 1520DM, Armada 4131T**

Compaq Computer Corp.'s latest notebooks offer good choices for all levels of users. The value-class Armada 1520DM (\$2,200 street), with a 133-MHz Pentium CPU and 11.3-inch DSTN screen, stresses a single-piece design: The AC adapter is built-in, so you only need a power cable to hit the road. The Pen-

tium/133-based Armada 4131T subnotebook (\$3,000 street), with a 12.1-inch TFT display, is the modularity king. The high-performance Armada 7750MT (\$6,550 street) packs a 166-MHz Pentium MMX processor and a 12.1-inch TFT screen to serve well as a desktop replacement system.

Within the 8-pound (travel weight) Armada 1520DM's rugged case is an integrated 33.6-Kbps modem and the ability to accept three drive types at once, as well as to mix lithium ion and nickel hydride batteries. We tested the unit with a lithium ion battery, which lasted 2:42 on our test. While its Pentium/133 CPU keeps benchmark test performance below the average of many of the tested systems in its class, both the CPU and the dual-scan screen help Compaq hold the 1520DM's price to an attractive level.

If you're looking for flexibility, the Armada 4131T is the ultimate multipurpose machine. The unit's travel weight is 7.1 pounds; add the optional \$370 Mobile CD unit, which attaches in slice fashion on the bottom, and you have a 9.1-pound unit. The 4131T has a removable handle, which also serves as a tilting stand and holds the standard lithium ion battery. Two optional lithium ion batteries (\$190 each) can fit in the 4131T at the same time, one replacing

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Compaq Armada 7750MT	Good	Good
Compaq Armada 1520DM	Fair	Good
Compaq Armada 4131T	Good	Good
Dell Latitude XPi CD M166ST	Good	Excellent
Dell Latitude LM M166ST	Good	Good

SUMMARY OF FEATURES

Pentium Notebooks

Spindles The number of drives, or spindles, installed in the unit: one (hard disk), two (floppy disk drive or CD-ROM drive), or three (all three).

LCD panel size, type, and resolution Diagonal screen size; screen type (lower-cost dual-scan DSTN technology or higher-quality active-matrix TFT technology); and resolution, either SVGA (800-by-600) or XGA (1,024-by-768).

Price of tested configuration The tested configuration includes a modem.

System weight, travel weight The system weight includes permanently installed drives, the battery, and the modem. If there is a modular drive bay, we include the weight of the CD-ROM drive only. The travel weight adds only the weight of the AC adapter and the power cord.

Installed/maximum hard disk capacity We report capacity in megabytes (1MB = 1,048,576 bytes). Some manufacturers quote millions of bytes, which inflates capacity by about 5 percent.

Maximum external resolution We list the maximum external resolution the unit supports at an adequately high refresh rate (70 Hz or better). Otherwise, we cite the native internal resolution and its corresponding external refresh rate.

NTSC video in/out NTSC (National Television Standards Committee) ports let you bring video in from—or send it out to—a TV, VCR, or camcorder.

Infrared (IrDA)/USB and ECP/EPP ports Infrared wireless, Universal Serial Bus, Enhanced Capabilities Port (the latest parallel-port standard), and Enhanced Parallel Port (the standard initiated in 1991).

CardBus slots These 32-bit successors to PC Card slots support transfer rates of up to 132 Mbps. They are backward-compatible.

Full-size alphanumeric/cursor keys The standard key pitch is 19 mm.

Rated charge time while on/off These are the vendors' claimed times.

Standby/hibernation mode In standby mode, the notebook uses battery power to keep system memory refreshed. In hibernation mode, the unit writes the contents of system memory to the hard disk, and there is no battery drain.

Minimum number of defective pixels for service or replacement Notebook vendors will replace or repair your machine if a certain number of screen pixels become defective.

Common features All units have Plug and Play and Flash BIOSes, ATAPI CD-ROM drives, and 16550 UART high-speed serial support.

SUMMARY OF FEATURES

Pentium Notebooks

■ YES ■ NO □ OPTIONAL

Products listed in review order

	(Acer) Texas Instruments TravelMate 7060	AcerNote Light 383	Alcam XL353 Plus	All Computer Technology ACT NA5130PX	All Computer Technology ACT NM5120VX	AMS TravelPro 2010CX	AMS TravelPro 187CT
Category/Number of spindles	High-end, 2	Value, 2	Value, 2	High-end, 2	Value, 3	High-end, 2	Value, 2
LCD panel size, type, and resolution	12.1" TFT SVGA	11.3" dual-scan SVGA	12.1" TFT SVGA	13.3" TFT XGA	12.1" TFT SVGA	13.3" TFT XGA	12.1" TFT SVGA
Price of tested configuration	\$4,500 (street)	\$2,600 (street)	\$2,600 (street)	\$4,898 (direct)	\$2,488 (direct)	\$5,000 (street)	\$2,900 (street)
Docking station/Port replicator	N/A	N/A	N/A, \$200 (street)	N/A	N/A	\$550, \$200 (street)	\$450, \$200 (street)
Spare battery	\$250 (street)	\$130; lithium ion, \$250 (street)	\$250 (street)	\$199 (direct)	\$199 (direct)	\$200 (street)	\$200 (street)
System weight/Travel weight (pounds)	7.6, 8.4	6.4, 7.1	6.9, 7.7	7.1, 8.0	7.7, 8.6	7.2, 8.1	6.4, 7.4
Dimensions (HWD, in inches)	22 x 12.2 x 9.4	28 x 11.9 x 8.8	18 x 11.9 x 9.1	23 x 12.0 x 9.6	24 x 11.8 x 9.0	20 x 11.8 x 9.3	2.0 x 11.6 x 8.6
Processor	Pentium MMX/166	Pentium MMX/150	Pentium/133	Pentium MMX/200	Pentium/133	Pentium MMX/166	Pentium/150
Installed/maximum system RAM	32MB EDO, 64MB	16MB EDO, 64MB	16MB EDO, 80MB	32MB EDO, 80MB	16MB EDO, 80MB	32MB EDO, 80MB	16MB EDO, 64MB
Installed external RAM cache and type	256K pipelined-burst	256K pipelined-burst	256K synchronous	512K pipelined-burst	256K pipelined-burst	512K pipelined-burst	256K pipelined-burst
Motherboard manufacturer	Acer	Acer	Samsung	Chicony	GVC	AMS Tech	AMS Tech
Chip set	Intel 82430MX	ALI M1521, M1523	SiS 551X	OPTi Viper N	Intel 82430MX	OPTi Viper N+	Intel 82430MX
BIOS manufacturer and version (or date)	Acer 2.0	Acer 2.1 R01B6F	Phoenix NoteBIOS 4.05	SystemSoft 1.01.25	Phoenix NoteBIOS 4.05	SystemSoft 1.0	Phoenix (1/16/97)
Display							
Graphics chip set	NeoMagic NM2090	C&T CT65550	Cirrus Logic CL-GD7548	C&T CT65550	NeoMagic NM2093	C&T CT65550	NeoMagic NM2090
RAM and type	1MB VRAM	1MB DRAM	1MB DRAM	2MB VRAM	1.3MB VRAM	2MB DRAM	1.5MB DRAM
Maximum external resolution	XGA at 72 Hz	SVGA at 72 Hz	XGA at 75 Hz	SVGA at 65 Hz	SVGA at 65 Hz	XGA at 85 Hz	XGA at 85 Hz
Storage							
Hard disk	IBM DCRA-22160	IBM DTNA-22160	Toshiba MK1301MAV	Toshiba MK2103MAV	Toshiba MK1301MAV	Toshiba MK2103MAV	Toshiba MK2103MAV
Installed/maximum capacity and interface	2GB, 2.1GB ATA-3	2GB, 2.1GB Fast ATA-3	1.3GB, 2GB ATA-2	2GB, 3.1GB ATA-3	1.3GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3
Floppy disk drive	Swappable	External	Swappable	Swappable	Internal	Swappable	External
Multimedia Features							
CD-ROM speed, manufacturer, and model	10X Toshiba XM-2402B	10X Matsushita UJDCD8730	10X Toshiba XM-2402B	8X TEAC CD-48E	8X TEAC CD-48E	10X Matsushita UJDCD8710	12X Torisan CDR-U112
Sound synthesis	FM	FM, wavetable	FM	FM	Wavetable	FM, wavetable	FM
Built-in stereo speakers/microphone	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-in/microphone jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-out/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■	■ ■ (not full size)	■ ■	■ ■	■ ■
Communications and Expansion							
Modem type and speed (data/fax, in Kbps)	Integrated 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	Integrated 33.6/14.4	PC Card 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4
Infrared (IrDA)/USB ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
ECP/EPP ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
External keyboard and mouse ports	Shared port	Shared port	Keyboard only	Shared port	Shared port	Shared port	Keyboard only
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III
CardBus socket	■	■	■	■	■	■	■
Miscellaneous							
Full-size alphanumeric/cursor keys	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Integrated pointing device	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad
Battery type	Lithium ion	Nickel hydride	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion
Rated charge time while on/off (hr:min)	4:00, 2:00	6:00, 2:00	6:00, 4:00	4:00, 3:00	4:00, 2:00	4:30, 1:40	4:30, 2:00
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Minimum number of defective pixels for LCD service or replacement	5; 3 if adjacent	5; 3 if adjacent	5; 2 if within 1 centimeter	5; 3 if in center of screen	5; 3 if in center of screen	5 in one quadrant	5 in one quadrant
Standard warranty on parts/labor	3 years/3 years	1 year/1 year	1 year/1 year	1 year/1 year	1 year/1 year	3 years/3 years	3 years/3 years
On-site service charge	N/A	N/A	N/A	\$259.95 (1 year)	\$199.95 (1 year)	N/A	N/A
24-hour, 7-day live technical support	■	■	■	■	■	■	■
24-hour turnaround for parts replacement	■	■	■	■	■	■	■

N/A—Not applicable. The product does not have this feature.

COVER STORY
Pentium Notebooks

Continues

ARMNote TS97MX	AST Ascentia P80	Brick Ergo CD-PowerBrick ³	Broadax XGA-1330	Broadax NP6280A	ChemBook 6800	Compaq Armada 7750MT	Compaq Armada 1520DM	Compaq Armada 4131T
High-end, 3 12.1" TFT SVGA	High-end, 2 12.1" TFT SVGA	High-end, 3 12.1" TFT SVGA	High-end, 2 13.3" TFT XGA	Value, 3 12.1" TFT SVGA	Value, 2 12.1" TFT SVGA	High-end, 2 12.1" TFT SVGA	Value, 3 11.3" dual-scan SVGA	Subnotebook, 2 12.1" TFT SVGA
\$3,300 (street) \$400 (street), N/A \$200 (street)	\$4,800 (street) \$800, \$130 (street) \$190 (street)	\$3,795 (direct) \$495 (direct), N/A \$199 (direct)	\$4,598 (direct) N/A \$200 (direct)	\$3,480 (direct) N/A \$80; lithium ion, \$175 (direct)	\$2,580 (direct) N/A \$85; lithium ion, \$200 (direct)	\$6,550 (street) \$850, \$460 (street) \$199 (street)	\$2,200 (street) N/A \$190 (street)	\$3,000 (street) N/A \$190 (street)
7.5, 8.4 2.4 x 11.9 x 9.1 Pentium MMX/200 32MB EDO, 80MB 256K pipelined- burst GVC/Alpha Top Intel 82430MX Phoenix NoteBIOS 4.05	7.8, 8.5 2.3 x 12.1 x 9.0 Pentium MMX/166 32MB EDO, 80MB 256K synchronous Quanta Intel 82430MX Phoenix NoteBIOS 3.03	7.0, 8.2 2.2 x 11.8 x 9.0 Pentium MMX/200 32MB EDO, 80MB 256K pipelined- burst Alpha Top Intel 82430MX Phoenix NoteBIOS 4.05	7.1, 8.0 2.5 x 11.8 x 9.5 Pentium MMX/200 32MB EDO, 80MB 512K pipelined- burst Chicony OPTi 82C556M SystemSoft 1.01.25	7.1, 9.4 2.3 x 11.8 x 9.3 Pentium MMX/200 16MB EDO, 72MB 256K pipelined- burst Kapak UMC 3232AF-7 SystemSoft 1.01.26	8.1, 9.2 2.2 x 11.8 x 8.9 Pentium/133 16MB EDO, 72MB 256K pipelined- burst Kapak SiS 5101, 5102, 5103 SystemSoft 1.01.26	7.7, 8.0 2.0 x 12.5 x 9.3 Pentium MMX/166 32MB EDO, 144MB 256K synchronous Compaq Compaq Compaq (3/21/97)	7.5, 8.0 2.0 x 12.0 x 9.5 Pentium/133 16MB EDO, 80MB 256K pipelined- burst Compaq OPTi Firestar 82C700 Compaq (2/11/97)	6.1, 7.1 1.5 x 11.4 x 10.3 Pentium/133 16MB EDO, 48MB 256K pipelined- burst Compaq OPTi Viper N+ Compaq (2/28/97)
NeoMagic NM128ZV 1.3MB DRAM SVGA at 60 Hz	C&T CT65550 2MB VRAM SVGA at 64 Hz	NeoMagic NM2093ZV 1MB SGRAM XGA at 85 Hz	C&T CT65550 2MB DRAM SVGA at 60 Hz	Trident Cyber 9385 2MB DRAM SVGA at 60 Hz	Trident Cyber 9385 2MB DRAM SVGA at 60 Hz	S3 Aurora64V+ 2MB DRAM XGA at 70 Hz	Cirrus Logic CL-GD7548 1MB DRAM XGA at 70 Hz	Cirrus Logic CL-GD7548 1MB DRAM XGA at 70 Hz
Toshiba MK3003MAN 2.9GB, 2.9GB ATA-3 Internal	IBM DLGA-23080 2.9GB, 2.9GB ATA-3 Swappable	Toshiba MK2101MAN 2GB, 3GB ATA-3 Internal	Toshiba MK2103MAV 2GB, 2.1GB ATA-3 Swappable	Toshiba MK2103MAV 2GB, 2.1GB ATA-3 Swappable	Toshiba MK1003MAV 1GB, 2.1GB ATA-3 Swappable	IBM DCRA-22160 2GB, 3GB ATA-3 Swappable	Toshiba MK1002MAV 1GB, 1.4GB ATA-3 Swappable	IBM DMCA21440 1.4GB, 1.4GB ATA-3 Internal
8X TEAC CD-48E FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■	10X Toshiba XM-1502B FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■	8X TEAC CD-48E Wavetable ■ ■ ■ ■ ■ ■ ■ ■	10X Matsushita UJDCD8710 FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■	12X TEAC CD-211E FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■	8X TEAC CD-48E FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■	8X Sanyo CRD-S68P1 FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■	10X Matsushita UJDCD8700 FM ■ ■ ■ ■ ■ ■ ■ ■	8X Compaq Mobile CD Unit (\$370 street) FM, wavetable ■ ■ ■ ■ ■ ■ ■ ■
PC Card 33.6/14.4 ■ ■ ■ ■ Shared port One Type II/III and one Type II ■	Integrated 28.8/14.4 ■ ■ ■ ■ Shared port Two Type II or one Type III ■	PC Card 33.6/14.4 ■ ■ ■ ■ Shared port One Type II/III and one Type II ■	Integrated 33.6/14.4 ■ ■ ■ ■ Shared port Two Type II or one Type III ■	PC Card 33.6/14.4 ■ ■ ■ ■ Shared port Three Type II or one Type II and one Type III ■	PC Card 33.6/14.4 ■ ■ ■ ■ Shared port Two Type II or one Type II and one Type III ■	Integrated 33.6/14.4 ■ ■ ■ ■ Shared port Two Type II or one Type III ■	Integrated 33.6/14.4 ■ ■ ■ ■ Shared port Two Type II or one Type III ■	PC Card 28.8/14.4 ■ ■ ■ ■ Shared port Two Type II or one Type III ■
■ ■ Touch pad Lithium ion 4:00, 2:00 ■ ■ 5	■ ■ Touch pad Lithium ion 4:00, 2:30 ■ ■ 3	■ ■ Touch pad Lithium ion 2:05, 1:30 ■ ■ 3 in one quadrant	■ ■ Touch pad Lithium ion 4:00, 2:00 ■ ■ 16; 2 if adjacent	■ ■ Touch pad Nickel hydride 4:00, 2:00 ■ ■ 16; 2 if adjacent	■ ■ Touch pad Nickel hydride 3:30, 2:00 ■ ■ 7	■ ■ Pointing stick Lithium ion 3:00, 1:30 ■ ■ 10; 2 if within 1 inch	■ ■ Touch pad Lithium ion 4:00, 3:00 ■ ■ 10; 2 if within 1 inch	■ ■ Touch pad Lithium ion 2:00, 1:00 ■ ■ 10; 2 if within 1 inch
1 year/1 year Included (1 year) ■ ■	3 years/3 years N/A ■ ■	4 years/4 years Included (years 2-4) ■ ■	1 year/1 year N/A ■ ■	1 year/1 year N/A ■ ■	1 year/1 year N/A ■ ■	3 years/1 year \$49 (1 year) ■ ■	1 year/1 year \$49 (1 year) ■ ■	3 years/1 year \$49 (1 year) ■ ■

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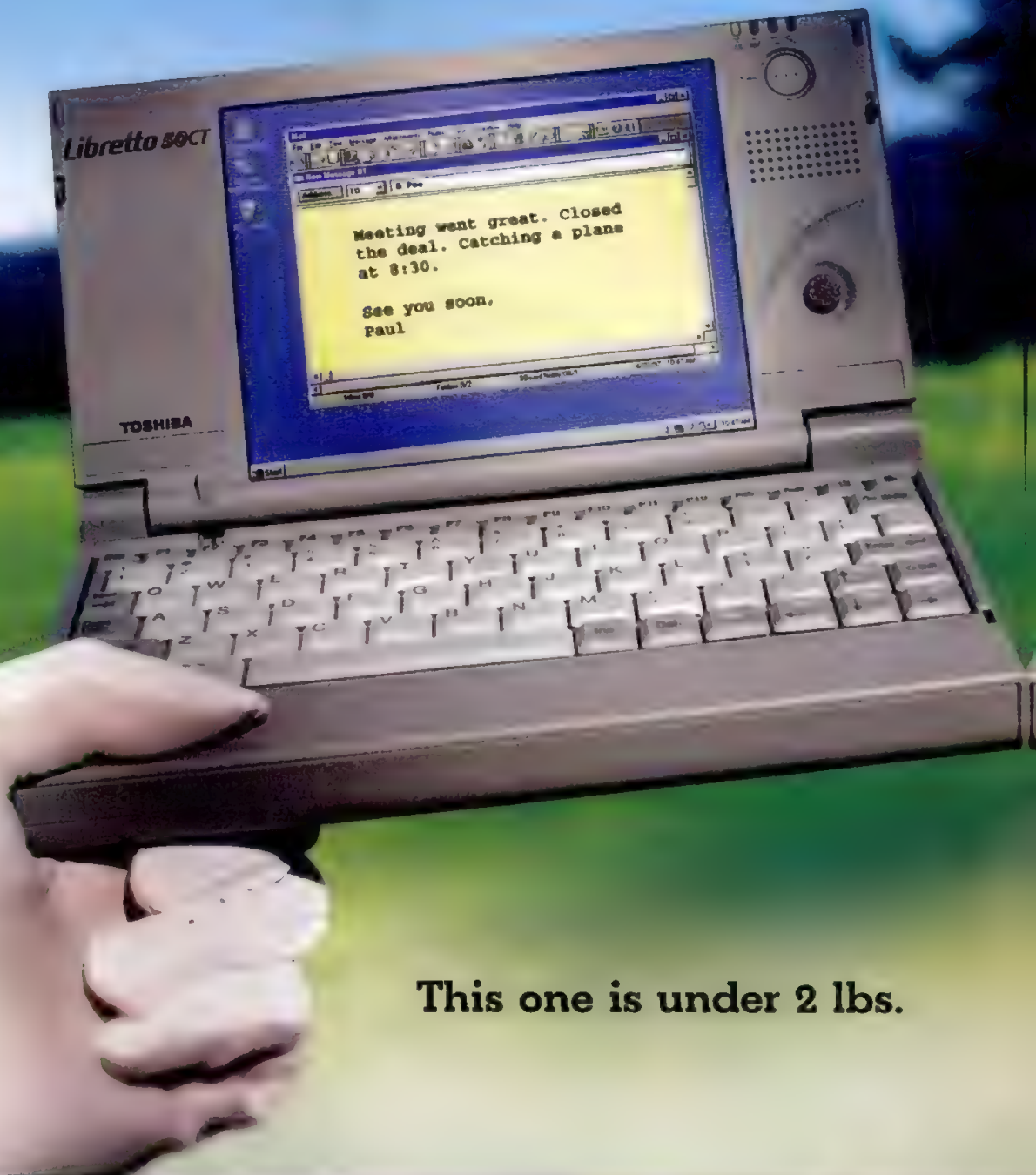
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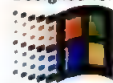
A powerful Pentium® processor delivers all the performance you need.



CONNECTIVITY

With the PC card slot you can stay connected with a modem and hook up to a floppy disk drive or CD-ROM. Experience wireless connectivity with built-in infrared capabilities.

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Windows®95**

WINDOWS 95 PERFORMANCE

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LIBRETTO 50CT

- 6.1" dia active matrix TFT color display 640 x 480 resolution
- 75MHz (2.9v) Pentium® processor, 16KB internal cache
- 510 million byte (~772MB) HDD
- 16MB EDO DRAM (expandable to 32MB)

- Built in 16-bit audio with internal speaker
- External floppy disk drive
- One Type II PC Card slot supports modem, floppy disk drive or optional CD-ROM drive
- Serial Infrared IrDA compliant port

- Lithium Ion battery
- Libretto Accupoint™ pointing device
- 1.85 lbs
- 8.3" x 4.5" x 1.3"
- Optional Enhanced Port Replicator or optional Port Expander

- Windows 95 standard
- 1-year limited warranty
- Toll-free technical support - 7 days a week, 24 hours a day

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SUMMARY OF FEATURES

Pentium Notebooks



■ YES □ NO □ OPTIONAL

Products listed in review order

	Dell Latitude XPi CD M166ST	Dell Latitude LM M166ST	DFI 8120	Digital HiNote VP 575	EMPaC Classic 5166	EPS Apex XL-200MMX	Everex StepNote MX
Category/Number of spindles	High-end, 3	Value, 2	High-end, 3	High-end, 3	Value, 2	High-end, 2	Value, 2
LCD panel size, type, and resolution	12.1" TFT SVGA	12.1" TFT SVGA	12.1" TFT SVGA	12.1" TFT SVGA	11.3" TFT SVGA	13.3" TFT XGA	11.3" TFT SVGA
Price of tested configuration	\$5,019 (direct)	\$3,619 (direct)	\$4,000 (street)	\$4,890 (street)	\$3,170 (street)	\$3,895 (direct)	\$2,800 (street)
Docking station/Port replicator	N/A, \$299 (direct)	N/A, \$159 (direct)	N/A, \$90 (street)	N/A, \$300 (street)	N/A	N/A	N/A, \$120 (street)
Spare battery	\$199 (direct)	\$199 (direct)	\$200 (street)	\$280 (street)	\$12 (street)	\$179 (direct)	\$170; lithium ion, \$225 (street)
System weight/Travel weight (pounds)	7.4, 8.3	7.1, 7.7	7.7, 8.5	7.2, 7.8	6.8, 8.3	7.2, 10.0	7.1, 7.9
Dimensions (HWD, in inches)	2.5 x 11.0 x 9.0	2.0 x 11.8 x 8.9	2.3 x 11.6 x 9.1	1.8 x 11.8 x 8.8	1.7 x 11.5 x 9.3	1.8 x 11.9 x 9.6	2.0 x 11.8 x 9.3
Processor	Pentium MMX/166	Pentium MMX/166	Pentium MMX/200	Pentium MMX/166	Pentium/166	Pentium MMX/200	Pentium MMX/166
Installed/maximum system RAM	32MB EDO, 80MB	16MB EDO, 72MB	32MB EDO, 64MB	32MB EDO, 80MB	16MB EDO, 64MB	32MB EDO, 80MB	16MB EDO, 80MB
Installed external RAM cache and type	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	512K pipelined-burst	256K synchronous
Motherboard manufacturer	Sony/Dell	Compal	Mitac	Compal	DiamondFlower	Chicony	First International Computer
Chip set	Pico Power Vesuvius-LS	Intel 82430MX	UMC 8891 EY	Intel 82430MX	SiS 5103	OPTi Viper	ACC Micro ACC2051
BIOS manufacturer and version (or date)	Phoenix/Dell A00	Phoenix/Dell NoteBIOS 4.0	Phoenix R1.06	Phoenix NoteBIOS 4.05	Phoenix R1.11	SystemSoft 1.2	Phoenix NoteBIOS 4.05
Display							
Graphics chip set	NeoMagic NM2093	NeoMagic NM2093	Trident Cyber 9385	NeoMagic NM2093	Trident Cyber 9385	C&T CT65550	NeoMagic NM2093
RAM and type	1.1MB EDO DRAM	1.1MB EDO DRAM	2MB VRAM	1.1MB DRAM	2MB DRAM	2MB VRAM	1.5MB VRAM
Maximum external resolution	SVGA at 85 Hz	XGA at 75 Hz	SVGA at 60 Hz	XGA at 72 Hz	SVGA at 66 Hz	SVGA at 60 Hz	XGA at 75 Hz
Storage							
Hard disk	IBM DLGA-23080	IBM DMCA-21440	Toshiba HDD-2619	IBM DTNA-22160	Toshiba MK2103MAV	Toshiba MK2103MAV	Seagate ST19150A9
Installed/maximum capacity and interface	2.9GB, 2.9GB ATA-3	1.3GB, 1.4GB ATA-3	2.9GB, 3GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3
Floppy disk drive	Internal	Swappable	External	Swappable	Internal	Swappable	Swappable
Multimedia Features							
CD-ROM speed, manufacturer, and model	10X Torisan CDR-N110	10X Torisan CDR-N110	10X Matsushita UJDCD8710	12X Torisan CDR-U112	10X Toshiba XM-2402B	10X Matsushita UJDCD8713	10X Torisan CDR-N110
Sound synthesis	FM, wavetable	FM	FM, wavetable	FM, wavetable	FM, wavetable	Wavetable	FM
Built-in stereo speakers/microphone	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-in/microphone jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-out/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Communications and Expansion							
Modem type and speed (data/fax, in Kbps)	PC Card 33.6/14.4	PC Card 33.6/14.4	Integrated 33.6/14.4	PC Card 28.8/14.4	Integrated 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4
Infrared (IrDA)/USB ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
ECP/EPP ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
External keyboard and mouse ports	Shared port	Shared port	Shared port	Shared port	Both	Shared port	Shared port
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III
CardBus socket	■	■	■	■	■	■	■
Miscellaneous							
Full-size alphanumeric/cursor keys	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Integrated pointing device	Trackball	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad
Battery type	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Nickel hydride
Rated charge time while on/off (hr:min)	2:30, 1:30	4:00, 3:00	4:00, 2:00	3:30, 2:00	3:00, 0:58	3:00, 2:00	4:30, 3:30
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Minimum number of defective pixels for LCD service or replacement	4 in an area the size of a quarter	4 in an area the size of a quarter	3	No set policy	1	11	5
Standard warranty on parts/labor	1 year/2 years	1 year/1 year	1 year/3 years	1 year/1 year	1 year/1 year	2 years/2 years	2 years/1 year
On-site service charge	Included (1 year)	\$149 (1 year; includes 2 more years on parts)	N/A	N/A	N/A	N/A	N/A
24-hour, 7-day live technical support	■	■	■	■	■	■	■
24-hour turnaround for parts replacement	■	■	■	■	■	■	■

N/A—Not applicable: The product does not have this feature

COVER STORY
Pentium Notebooks

Continues

					PC MAGAZINE EDITORS' CHOICE	PC MAGAZINE EDITORS' CHOICE		
Foxa AP 6300T	Fujitsu LifeBook 531T	Fujitsu LifeBook 655Tx	FutureTech FutureMate FM9720TA	FutureTech FutureMate FM4013D	Gateway Solo 9100 S5-166	Gateway Solo 2200 S5-133	Hewlett-Packard OmniBook 5700CTX	Hewlett-Packard OmniBook 2000
High-end, 3 12.1" TFT SVGA	Value, 2 11.3" TFT SVGA	Subnotebook, 1 12.1" TFT SVGA	High-end, 2 13.3" TFT XGA	Value, 2 11.3" dual-scan SVGA	High-end, 3 13.3" TFT XGA	Value, 2 12.1" TFT SVGA	High-end, 2 12.1" TFT XGA	Value, 2 12.1" TFT SVGA
\$3,200 (direct)	\$2,500 (street)	\$4,000 (street)	\$3,799 (direct)	\$2,149 (direct)	\$5,599 (direct)	\$3,074 (direct)	\$5,690 (street)	\$3,710 (street)
N/A, \$145 (direct)	N/A, \$150 (street)	N/A	N/A	N/A	\$599, \$199 (direct)	\$599, \$199 (direct)	\$630, \$180 (street)	\$630 (street), N/A
\$185 (direct)	\$240 (street)	\$280 (street)	\$247 (direct)	\$249 (direct)	\$250, nickel hydride, \$95 (direct)	\$250, nickel hydride, \$95 (direct)	\$210 (street)	\$210 (street)
7.6, 8.8	7.1, 8.3	5.4, 6.0	7.2, 8.2	7.1, 7.7	8.5, 9.2	6.1, 6.9	7.0, 7.9	6.8, 7.7
2.3 x 11.9 x 9	2.0 x 11.7 x 9.3	1.2 x 11.6 x 9.3	2.0 x 11.8 x 9.3	2.0 x 11.7 x 8.8	1.9 x 12.3 x 9.5	1.8 x 11.3 x 8.8	1.9 x 11.6 x 8.9	1.9 x 11.6 x 8.9
Pentium MMX/200	Pentium/133	Pentium MMX/150	Pentium MMX/200	Pentium/133	Pentium MMX/166	Pentium/133	Pentium MMX/166	Pentium MMX/133
32MB EDO, 72MB	16MB EDO, 80MB	16MB EDO, 80MB	32MB EDO, 80MB	16MB EDO, 40MB	32MB SDRAM, 160MB	16MB EDO, 80MB	32MB, 128MB	16MB, 128MB
256K pipelined- burst	256K pipelined- burst	256K pipelined- burst	256K pipelined- burst	256K pipelined- burst	256K pipelined- burst	256K pipelined- burst	512K pipelined- burst	N/A
Kapok	Fujitsu	Fujitsu	Chicony	Compal	Intel	Intel	HP	HP
SiS 510X	Intel 82430MX	Intel 82430MX	OPTi 8205577	Intel 82430MX	Intel 82430TX	Intel 82430MX	OPTi Viper M+	OPTi Viper M+
SystemSoft 6X00-05-07	Phoenix NoteBIOS 4.05	Phoenix NoteBIOS 4.05	SystemSoft 0.21	Phoenix NoteBIOS 4.0	Phoenix NoteBIOS 4.0	Phoenix 6.32	SystemSoft 1.01	SystemSoft 1.01
Trident Cyber 9385	C&T CT65550	C&T CT65550	C&T CT65550	NeoMagic NM2070	C&T CT65554	C&T CT65554	C&T CT65554	C&T CT65554
2MB DRAM	2MB DRAM	2MB DRAM	2MB VRAM	1MB VRAM	4MB EDO	2MB VRAM	2MB DRAM	2MB EDO DRAM
XGA at 75 Hz	XGA at 72 Hz	XGA at 72 Hz	SVGA at 85 Hz	SVGA at 60 Hz	XGA at 85 Hz	XGA at 85 Hz	XGA at 75 Hz	XGA at 75 Hz
Toshiba MK2103MAV	Maxtor 251350AT	Toshiba MK1301MAV	Hitachi DK225A-21	IBM DMCA-21440	IBM DLGA-23080	IBM DMCA-21440	Toshiba MK3003MAN	Toshiba HDD-2616
2GB, 2.1GB ATA-3	1.3GB, 1.3GB EIDE	1.3GB, 1.3GB ATA-3	2GB, 3GB ATA-3	1.3GB, 2.1GB ATA-3	2.9GB, 2.9GB ATA-3	1.3GB, 2GB ATA-3	2.9GB, 2.9GB ATA-3	2GB, 2GB EIDE
Swappable	External	External	Swappable	Swappable	Swappable	Swappable	Internal	Swappable
12X TEAC CD-211E	10X Matsushita UJDCD8711	8X TEAC CD-48E	10X Matsushita UJDCD8713	10X Torisan CDR-N110	10X Toshiba XM-1502B	10X Toshiba XM-1502B	10X Toshiba XM-2402B	10X Toshiba XM-2402B
FM, wavetable	FM	FM	FM	FM	FM, wavetable	FM, wavetable	FM	FM
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
PC Card 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Shared port	Shared port	Shared port	Shared port	Shared port	Shared port	Shared port	Shared port	Shared port
Three Type II or one Type II and one Type III	Two Type II or one Type III	Two Type II	Two Type II	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Pointing stick	Pointing stick
Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion
4:30, 3:00	9:00, 5:00	9:00, 5:00	3:00, 2:00	3:00, 2:00	3:00, 2:15	3:00, 3:00	3-4:00, 3-4:00	4:00, 4:00
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
3	4; 2 if in center of screen	4; 2 if in center of screen	10 prominent or brightly lit	10 prominent or brightly lit	No set policy	No set policy	15; 4 if in a space the size of a thumb	15; 4 if in a space the size of a thumb
1 year/1 year	3 years/3 years	3 years/3 years	1 year/1 year	1 year/1 year	1 year/1 year	1 year/1 year	3 years/3 years	3 years/3 years
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
					□ (\$100 for 1 year)	□ (\$100 for 1 year)		

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If you've got flexibility on your mind, look to the Armada 4100 Family. It transforms from a lightweight, 1.5" slimline notebook to a multimedia notebook with an optional and detachable CD-ROM base. It can even work harder (and longer) for you when you utilize its 3-battery configuration.

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Armada 7700 Family



Armada 4100 Family



Armada 1500 Family

ARMADA	7700 Family	4100 Family	1500 Family
Processor	150MHz – 166MHz Pentium Processor with MMX™ technology	133MHz Pentium Processor – 166MHz Pentium Processor with MMX™ technology	133MHz Pentium Processor – 150MHz Pentium Processor with MMX™ technology
Display	12.1" CTFT (SVGA or 1024 x 768)	12.1" CSTN or 12.1" CTFT (SVGA)	12.1" CTFT or 12.1" CSTN (SVGA)
Standard/Max Memory	16MB or 32MB EDO RAM up to 144MB 2 slots	16MB up to 80MB	16MB EDO RAM up to 80MB
Hard Drive (SMART)	1.6GB – 2.1GB (up to 3.0GB optional)	1.4GB – 2.0GB	1.4GB – 2.1GB
CD-ROM	8X optional	8X optional	Integrated 10X
Modem	Integrated 33.6 Kbps data/fax Upgradable to K56 flex protocol*	Compaq PC Card optional	Integrated 33.6 Kbps data/fax
Integrated AC Adapter	Yes	No	Yes
Battery Type/Life**	Li-Ion up to 2.5 hr (up to 2 batteries)	Li-Ion up to 2.5 – 3 hr (up to 3 batteries)	Li-Ion up to 3.5 hr (up to 2 batteries)
Desktop Expansion	Convenience Base or Expansion Base (with tower stand optional)	Convenience Base (with or without Ethernet)	Convenience Base (with or without Ethernet)
Pre-installed Software	Microsoft Windows 95 or NT Workstation 4.0	Microsoft Windows 95	Microsoft Windows 95 or NT Workstation 4.0
Dimensions/Weight	2.0" x 12.6" x 9.5" / 7.8 lb – 7.9 lb	Slimline: 1.49" x 11.4" x 8.8" / 5.3 lb Standard: 1.49" x 11.6" x 10.3" / 6.2 lb Multimedia: 2.3" x 12.6" x 9.5" / 8.3 lb	2.1" x 12.2" x 9.6" / 7.35 lb – 7.52 lb
Limited Warranty†	3-year worldwide limited warranty	3-year worldwide limited warranty	1-year worldwide limited warranty with optional 2-year upgrade available



Featured products not sold through retail locations. Reseller prices may vary. Other models may be available. Offer valid in the U.S. only. *Upgrade planned for year end. The K56 flex protocol is designed only to allow faster downloads from K56 flex compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56Kbps, and will vary depending on line conditions. **Batteries life is estimated based on normal usage and with Advanced Power Management. †The Compaq Armada 7700 and 4100 Families are covered by a Three-Year Worldwide Limited Warranty with pick up/carry in service. The Compaq Armada 1500 Family is covered by a One-Year Worldwide Limited Warranty with pick up/carry in service. Battery packs and certain options are covered by a One-Year Limited Warranty. ©1997 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo registered U.S. Patent and Trademark Office. Products, prices and programs are subject to change without notice. Windows is a registered trademark of Microsoft Corporation. The Intel Inside Logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Other products are trademarks of their respective companies.

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SUMMARY OF FEATURES

Pentium Notebooks



■ YES ■ NO □ OPTIONAL

Products listed in review order

	Hewlett-Packard OmniBook 800CT	Hitachi VisionBook Pro	IBM ThinkPad 765D	IBM ThinkPad 380D	IBM ThinkPad 580E	Jetta JetBook 7000+	Jetta JetBook 6300CD
Category/Number of spindles	Subnotebook, 1	High-end, 3	High-end, 2	Value, 3	Subnotebook, 1	High-end, 2	Value, 3
LCD panel size, type, and resolution	10.4" TFT SVGA	13.3" TFT XGA	13.3" TFT XGA	12.1" TFT SVGA	12.1" TFT SVGA	12.1" TFT SVGA	12.1" TFT SVGA
Price of tested configuration	\$4,750 (street)	\$5,500 (street)	\$6,500 (street)	\$4,120 (street)	\$4,800 (street)	\$3,651 (list)	\$2,650 (list)
Docking station/Port replicator	N/A	N/A, \$300 (street)	\$750, \$150 (street)	N/A, \$300 (street)	N/A, \$180 (street)	\$475 (street), N/A	N/A
Spare battery	\$130 (street)	\$220 (street)	\$270 (street)	\$250 (street)	\$250 (street)	\$125 (street)	\$125 (street)
System weight/Travel weight (pounds)	3.9, 4.8	7.6, 8.3	7.8, 8.4	6.9, 7.6	4.1, 6.2	7.7, 9.0	7.7, 8.7
Dimensions (HWD, in inches)	1.5 x 11.1 x 7.2	1.8 x 12.1 x 9.5	2.2 x 11.8 x 9.3	2.3 x 11.8 x 9.2	1.2 x 11.7 x 8.7	2.4 x 11.8 x 9.3	2.4 x 11.9 x 9.1
Processor	Pentium/166	Pentium MMX/166	Pentium MMX/166	Pentium MMX/150	Pentium MMX/166	Pentium MMX/200	Pentium/133
Installed/maximum system RAM	32MB EDO, 80MB	32MB EDO, 144MB	32MB EDO, 104MB	16MB EDO, 80MB	32MB EDO, 80MB	32MB EDO, 64MB	16MB, 40MB
Installed external RAM cache and type	512K pipelined-burst	512K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst
Motherboard manufacturer	HP	Hitachi	IBM	Intel	IBM	Mitac	MaxTech
Chip set	VLSI Eagle II	Intel 82430TX	Intel 82430MX	Intel 82430MX	Intel 82430MX	UMC 8890BN	OPTi Viper
BIOS manufacturer and version (or date)	SystemSoft 1.01	Phoenix NoteBIOS 4.0	IBM (4/15/97)	IBM (2/13/97)	IBM (4/1/97)	Phoenix NoteBIOS 4.04	Phoenix NoteBIOS 4.0
Display							
Graphics chip set	NeoMagic NM2093	C&T CT65554	Trident Cyber 9385	NeoMagic NM2093	Trident Cyber 9385	Trident Cyber 9385	Cirrus Logic CL-GD7543
RAM and type	1.8MB EDO DRAM	2MB VRAM	2MB VRAM	1.1MB VRAM	2MB VRAM	2MB VRAM	2MB DRAM
Maximum external resolution	XGA at 75 Hz	XGA at 75 Hz	XGA at 75 Hz	XGA at 85 Hz	XGA at 75 Hz	SVGA at 75 Hz	SVGA at 75 Hz
Storage							
Hard disk	Toshiba HDD-2616	IBM DTNA-22160	IBM DLGA-23080	IBM DSOA-2108	IBM DTNA-22110	Toshiba MK3003MAN	Hitachi DK225A-21
Installed/maximum capacity and interface	2GB, 2GB EIDE	2GB, 2.1GB ATA-3	2.9GB, 3GB EIDE	2.1GB, 2.1GB EIDE	2.1GB, 2.1GB IDE	2.9GB, 2.9GB ATA-3	2GB, 2.1GB ATA-3
Floppy disk drive	External	Internal	External	Internal	External	Swappable	Internal
Multimedia Features							
CD-ROM speed, manufacturer, and model	N/A	10X Toshiba XM-1502B	8X Sanyo CRD-S58P	8X TEAC CD-38E	4X IBM 1969-009	10X Matsushita UJDCD8710	8X TEAC CD-48E
Sound synthesis	FM	FM, wavetable	FM, wavetable	FM	FM, wavetable	Wavetable	Wavetable
Built-in stereo speakers/microphone	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-in/microphone jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-out/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■ (needs adapter)	■ ■	■ ■	■ ■	■ ■
Communications and Expansion							
Modem type and speed (data/fax, in Kbps)	PC Card 33.6/14.4	Integrated 56.6/14.4	Integrated 28.8/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	Integrated 33.6/14.4	PC Card 33.6/14.4
Infrared (IrDA)/USB ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
ECP/EPP ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
External keyboard and mouse ports	None	Shared port	Mouse only	Shared port	Shared port	Shared port	Shared port
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II	One Type II/III and one Type II
CardBus socket	■	■	■	■	■	■	■
Miscellaneous							
Full-size alphanumeric/cursor keys	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Integrated pointing device	Pop-out mouse	Touch pad	Pointing stick	Pointing stick	Pointing stick	Touch pad	Touch pad
Battery type	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Lithium ion	Nickel hydride	Nickel hydride
Rated charge time while on/off (hr:min)	2:30, 2:30	6:00, 4:00	2:00, 1:30	3:00, 2:00	2:30, 1:30	4:00, 2:00	4:00, 2:00
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Minimum number of defective pixels for LCD service or replacement	15; 4 if in a space the size of a thumb	5; 3 if adjacent	21	21	21	4	4
Standard warranty on parts/labor	3 years/3 years	3 years/3 years	3 years/3 years	1 year/1 year	1 year/1 year	1 year/1 year	1 year/1 year
On-site service charge	N/A	N/A	\$49 per year	\$49 per year	\$49 per year	N/A	N/A
24-hour, 7-day live technical support	■	■	■	■	■	■	■
24-hour turnaround for parts replacement	■	■	■	■	■	■	■

N/A—Not applicable. The product does not have this feature.

COVER STORY
Pentium Notebooks

Continues



Keydata KeyNote 8660 XP	Maximus Medianote CD Book	MaxTech YesBook Model 753Plus	Micron TransPort XKE	Micron TransPort VLX	Micro X MX Edge	Micro X MX Entre	MOS 200MMX Power User	NEC Versa 6200MX
High-end, 2 13.3" TFT XGA	Value, 3 12.1" TFT SVGA	Value, 3 12.1" TFT SVGA	High-end, 2 13.3" TFT XGA	Value, 2 11.3" dual-scan SVGA	High-end, 2 13.3" TFT XGA	Value, 2 11.3" dual-scan SVGA	High-end, 3 12.1" TFT SVGA	High-end, 2 13.3" TFT XGA
\$4,395 (direct)	\$2,199 (direct)	\$4,000 (street)	\$5,899 (direct)	\$2,427 (direct)	\$3,995 (direct)	\$2,095 (direct)	\$3,449 (direct)	\$6,350 (street)
N/A, \$160 (direct)	N/A	\$475 (list), N/A	\$499 (direct), N/A	N/A	N/A, \$139 (direct)	N/A	N/A, \$120 (direct)	\$900, \$200 (street)
\$188 (direct)	\$99 (direct)	\$250 (list)	\$199 (direct)	\$99 (direct)	\$195 (direct)	\$195 (direct)	\$180 (direct)	\$200 (street)
7.3, 8.2	7.8, 9.2	7.5, 8.4	8.3, 9.1	7.2, 8.2	7.2, 7.9	7.0, 7.9	7.8, 10.0	7.9, 8.7
1.9 x 11.9 x 9.5	2.4 x 11.8 x 9.3	2.4 x 11.9 x 9.1	2.3 x 12.1 x 9.9	1.8 x 12.1 x 9.3	1.8 x 11.9 x 9.6	2.2 x 12.0 x 9.1	2.0 x 11.8 x 8.9	2.3 x 11.8 x 9.9
Pentium MMX/200	Pentium MMX/166	Pentium MMX/166	Pentium MMX/166	Pentium/133	Pentium MMX/200	Pentium/166	Pentium MMX/200	Pentium MMX/166
32MB EDO, 80MB	16MB EDO, 64MB	16MB EDO, 80MB	32MB EDO, 128MB	16MB EDO, 40MB	32MB EDO, 80MB	16MB, 40MB	32MB EDO, 72MB	32MB EDO, 128MB
256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	512K pipelined-burst	256K pipelined-burst	256K synchronous	256K synchronous	256K pipelined-burst	256K pipelined-burst
Chicony	Sunrex	GVC	Sanyo	GVC	Chicony	Chicony	Kapok	Jabil
OPTi Viper	VIA Master 82C570MV	Intel 82430MX	Intel 82430TX	Intel 82430MX	OPTi Viper NX	OPTi Viper	SiS 5101, 5102, 5103, 5107	Intel 82430MX
SystemSoft (1/31/97)	AMI (11/7/96)	Phoenix NoteBIOS 4.05	Phoenix NoteBIOS 4.06	Phoenix NoteBIOS 4.05	SystemSoft SS 1.2 1997	Phoenix NoteBIOS 4.0	SystemSoft v7	AMI v20
C&T CT65550	C&T CT65550	NeoMagic NM2093	NeoMagic NM2160	NeoMagic NM2093	C&T CT65550	C&T CT65548	Trident Cyber 9385	C&T CT65550
2MB DRAM	2MB VRAM	1.3MB DRAM	2MB EDO DRAM	1.2MB EDO DRAM	2MB VRAM	2MB VRAM	2MB VRAM	2MB DRAM
SVGA at 75 Hz	SVGA at 72 Hz	SVGA at 65 Hz	XGA at 75 Hz	SVGA at 75 Hz	SVGA at 60 Hz	SVGA at 60 Hz	SVGA at 60 Hz	SVGA at 85 Hz
Toshiba MK2103MAV	Toshiba MK2101MAN	Toshiba MK2103MAV	IBM DLGA-23080	Hitachi DK225A-21	Toshiba MK3003MAN	Seagate ST92255AG	Toshiba MK2716	IBM DLGA-23080
2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2.9GB, 2.9GB ATA-3	2GB, 2.1GB ATA-3	2.9GB, 2.9GB ATA-3	2GB, 2GB EIDE	1.9GB, 2.1GB IDE	2.9GB, 2.9GB ATA-3
Swappable	Internal	Internal	Swappable	Swappable	Swappable	Swappable	Swappable	Swappable
10X Matsushita UJDCD8713	10X Toshiba XM-1502B	8X TEAC CD-48E	8X Sanyo CRDS341M	8X TEAC CD-48E	8X TEAC CD-48E	8X TEAC CD-48E	11X TEAC CD-211E	10X Toshiba XM-1502B
FM	FM	Wavetable	FM, wavetable	FM	FM	FM	FM, wavetable	FM
PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	Integrated 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/14.4	PC Card 33.6/24.4	PC Card 33.6/14.4
Shared port	Shared port	Both	Both	Shared port	Shared port	Shared port	Shared port	Shared port
Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	One Type II/III and one Type II	Two Type II or one Type III	Two Type II or one Type III
Touch pad	Touch pad	Touch pad	Touch pad and pointing stick	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad
Lithium ion	Nickel hydride	Lithium ion	Lithium ion	Nickel hydride	Lithium ion	Lithium ion	Lithium ion	Lithium ion
3:30, 3:30	4:30, 2:00	4:00, 1:30	6:00, 3:00	4:30, 2:30	4:00, 2:00	4:00, 2:00	4:00, 1:30	1:40, 1:40
8; 5 if adjacent	3	7	10	10	No set policy	No set policy	3	5; 3 if adjacent
1 year/1 year	1 year/1 year	1 year/1 year	3-5 years/1 year	1-5 years/90 days	1 year/1 year	1 year/1 year	4 years/4 years	3 years/3 years
\$260 (3 years)	Included (1 year)	N/A	N/A	\$269 (3 years)	N/A	N/A	\$149 (4 years)	Included (1 year)

100 REASONS WHY

Word Processor Features

Corel® WordPerfect® 8

Microsoft® Word 97

Support for Intel MMX™ Technology

Libraries

Clipart
Photos

Interface

Shadow Cursor
Tile documents vertically
Reveal Codes
Save workspace
Search for any codes
Application bar
Context-sensitive property bars

Internet*

Automatic natural language hyperlinks
Corel Barista™ (for Java™ publishing)
Java applets

Formatting Tools

QuickFonts/font preview
Spell check drop cap words
Guidelines
Font preview from drop-down list
Styles can include text and graphics
User-defined borders and fills
Image rotation
Make It Fit™ to expand documents
Customizable Make It Fit options across multiple pages
Parallel columns
Captions on any side of image
Undo levels
Multiple character drop caps

Tables

Row and column indicators
Automatic data fill (QuickFill)
Format painter tables
Automatic calculation
Formulas function across tables
Number of formulas

Long Documents

Create new lists
Expand/contract subdocuments individually
Predefined document summary fields

Proofing Tools

Combined Spell Checker/Thesaurus/Grammar
Prompt-As-You-Go
Document dictionaries and editable main dictionary
Automatic sentence rewrite (PerfectSense™)

SGML

Import/export
SGML editing and validation
Document creation tools based on DTD

Transitioning

Backward compatibility
Convert Corel® WordPerfect® for DOS macros
Use existing Corel WordPerfect for Windows® macros
Corel WordPerfect for DOS keyboards
Convert Corel WordPerfect 6.x files

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SUMMARY OF FEATURES

Pentium Notebooks

■ YES ■ NO □ OPTIONAL

Products listed in review order

	NEC Versa 2650CD	Olivetti Echo Pro 133S	Royal Mobile Best Buy	Samsung SENS Pro 525	Sceptre SoundX 4500	Sharp PC-9300T	Tatung TNB-5500
Category/Number of spindles	Value, 3	Value, 2	High-end, 3	High-end, 2	High-end, 2	Value, 3	Value, 2
LCD panel size, type, and resolution	12.1" dual-scan SVGA	12.1" TFT SVGA	12.1" TFT SVGA	12.1" TFT SVGA	12.1" TFT SVGA	11.3" TFT SVGA	12.1" TFT SVGA
Price of tested configuration	\$2,500 (street)	\$3,200 (street)	\$3,079 (direct)	\$3,999 (list)	\$3,950 (street)	\$3,000 (street)	\$2,995 (direct)
Docking station/Port replicator	N/A, \$150 (street)	\$1,000 (street), N/A	N/A	N/A, \$188 (list)	\$620, \$180 (street)	N/A, \$200 (street)	N/A
Spare battery	\$150 (street)	\$200 (street)	\$120 (direct)	\$249 (list)	\$270 (street)	\$160 (street)	N/A
System weight/Travel weight (pounds)	6.8, 7.9	6.9, 7.8	7.8, 9.1	7.0, 7.8	6.9, 7.5	7.5, 8.4	6.7, 7.5
Dimensions (HWD, in inches)	2.0 x 11.8 x 8.8	1.8 x 12.1 x 9.0	2.5 x 11.8 x 9.3	1.9 x 11.8 x 9.4	1.8 x 11.5 x 9.0	2.0 x 11.8 x 9.5	2.1 x 12.0 x 9.3
Processor	Pentium MMX/150	Pentium/133	Pentium MMX/200	Pentium MMX/150	Pentium MMX/166	Pentium/150	Pentium/133
Installed/maximum system RAM	16MB EDO, 80MB	16MB EDO, 128MB	32MB EDO, 128MB	48MB EDO, 80MB	32MB EDO, 80MB	16MB EDO, 48MB	16MB EDO, 48MB
Installed external RAM cache and type	256K pipelined-burst	256K pipelined-burst	256K synchronous	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst
Motherboard manufacturer	Sotec/Tottori-Sanyo	Chaplet	Sunrex	Samsung	Compal	Sharp/Twinhead	Tatung
Chip set	OPTi Viper 557/558	UMC 8890BN	OPTi 81C700	SiS SS11, SS12, SS13	Intel 82430MX	SiS 5501, 5502, 5503	OPTi 82C602A
BIOS manufacturer and version (or date)	SystemSoft 1.01	Phoenix NoteBIOS 4.05	AMI 1.05	Phoenix NoteBIOS 4.05	Phoenix NoteBIOS 4.0	Phoenix NoteBIOS 4.0	Phoenix NoteBIOS 4.0
Display							
Graphics chip set	C&T CT65550	Cirrus Logic CL-GD7548	C&T CT65554	Cirrus Logic CL-GD7548	NeoMagic NM2093	Trident Cyber 9385	Cirrus Logic CL-GD7548
RAM and type	1.5MB VRAM	2MB EDO DRAM	2MB VRAM	2MB DRAM	1.1MB VRAM	2MB EDO DRAM	2MB DRAM
Maximum external resolution	SVGA at 60 Hz	XGA at 72 Hz	SVGA at 60 Hz	XGA at 75 Hz	SVGA at 60 Hz	SVGA at 60 Hz	SVGA at 60 Hz
Storage							
Hard disk	Toshiba MDD2716CZE	IBM DCRA-22160	Toshiba MK2101MAN	IBM DTNA-22160	IBM DTNA-22160	Hitachi DK224A-14	IBM DSOA-2108
Installed/maximum capacity and interface	1.3GB, 1.4GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	2GB, 2.1GB ATA-3	1.3GB, 1.4GB ATA-3	1GB, 1.1GB EIDE
Floppy disk drive	Internal	Swappable	Internal	Swappable	Swappable	Internal	Swappable
Multimedia Features							
CD-ROM speed, manufacturer, and model	10X Torisan CDR-N110	8X TEAC CD-48E	10X Torisan CDR-N110	10X Toshiba XM-2402B	12X Torisan CDR-U112	10X Matsushita UJDCD8710	8X TEAC CD-48E
Sound synthesis	FM	FM	FM, wavetable	FM	FM	FM	Wavetable
Built-in stereo speakers/microphone	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-in/microphone jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Line-out/speaker jacks	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
NTSC video in/out	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Communications and Expansion							
Modem type and speed (data/fax, in Kbps)	PC Card 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	Integrated 28.8/14.4
Infrared (IrDA)/USB ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
ECP/EPP ports	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
External keyboard and mouse ports	Shared port	Shared port	Shared port	Mouse and shared port	Shared port	Shared port	Shared port
PC Card slots	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III
CardBus socket	■	■	■	■	■	■	■
Miscellaneous							
Full-size alphanumeric/cursor keys	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Integrated pointing device	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad	Touch pad
Battery type	Nickel hydride	Lithium ion	Nickel hydride	Lithium ion	Lithium ion	Nickel hydride	Nickel hydride
Rated charge time while on/off (hr:min)	4:00, 4:00	3:00, 3:00	3:00, 3:00	4:00, 2:00	5:00, 3:00	N/A, 4:00	4:00, 2:00
Standby/hibernation mode	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Minimum number of defective pixels for LCD service or replacement	5; 3 if adjacent	11; 3 if adjacent	5	3	8	No set policy	No set policy
Standard warranty on parts/labor	1 year/1 year	1 year/1 year	1 year/lifetime	3 years/3 years	3 years/3 years	3 years/3 years	2 years/2 years
On-site service charge	Included (1 year)	N/A	\$229.95 (4 years)	N/A	N/A	N/A	N/A
24-hour, 7-day live technical support	■	■	■	■	■	■	■
24-hour turnaround for parts replacement	■ (1 year only)	■	■	■	■	■	■

N/A—Not applicable: The product does not have this feature.

COVER STORY
Pentium Notebooks

Ends

Toshiba Teara 740CDT	Transmode Vibrant 166TMX	Twinhead Slimnote-3106TZ	WinBook FX P166MMX	WinBook FX P123
High-end, 2 13.3" TFT XGA	High-end, 2 12.1" TFT SVGA	High-end, 3 12.1" TFT SVGA	High-end, 2 12.1" TFT SVGA	Value, 2 11.3" TFT SVGA
\$6,684 (list)	\$4,199 (direct)	\$4,100 (street)	\$3,799 (direct)	\$2,499 (direct)
\$949 (list), N/A	\$249 (direct), N/A	N/A, \$100 (street)	\$399, \$139 (direct)	\$399, \$139 (direct)
\$289 (list)	Included	\$190 (street)	\$259 (direct)	\$259 (direct)
8.8, 9.5	7.2, 8.0	7.2, 8.1	7.7, 8.5	7.7, 8.4
2.3 x 11.8 x 9.5	2.0 x 11.8 x 9.0	1.9 x 11.5 x 9.3	2.3 x 11.4 x 9.3	2.3 x 11.5 x 9.0
Pentium MMX/166	Pentium MMX/166	Pentium MMX/166	Pentium MMX/166	Pentium/133
32MB EDO, 144MB	48MB EDO, 64MB	32MB EDO, 64MB	32MB EDO, 80MB	16MB EDO, 40MB
256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst
Toshiba	ASE	Twinhead	Quanta Computer	Quanta Computer
Toshiba Symphony 2	Intel 82430MX	SiS 550x	Intel 82430MX	Intel 82430MX
Toshiba 6.4	Phoenix NoteBIOS 4.0	Phoenix (2/15/97)	Phoenix NoteBIOS 4.0	Phoenix NoteBIOS 4.0
C&T CT6554	C&T CT65550	Trident Cyber 9385	C&T CT65550	Cirrus Logic CL-GD7548
2MB VRAM	2MB EDO DRAM	2MB VRAM	2MB EDO DRAM	1MB EDO DRAM
XGA at 85 Hz	XGA at 75 Hz	SVGA at 60 Hz	XGA at 75 Hz	XGA at 75 Hz
Toshiba MK2103MAV	Toshiba MK3003MAN	Toshiba MK1401MAV	Toshiba MK3003MAN	Toshiba MK2101MAN
2GB, 56B ATA-3	2.9GB, 2.9GB ATA-3	2GB, 2.1GB ATA-3	2.9GB, 2.9GB ATA-3	2.1GB, 2.9GB ATA-3
Swappable	Swappable	Internal	Swappable	Swappable
10X Toshiba XM-1502B	8X TEAC CD-48E	10X Toshiba XM-1502B	10X Toshiba XM-1502B	6X TEAC CD-46E
Wavetable	FM, wavetable	FM, wavetable	FM, wavetable	FM
■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■
Integrated 28.8/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	Integrated 33.6/14.4	Integrated 28.8/14.4
■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■
Shared port	Shared port	Shared port	Shared port	Shared port
Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III	Two Type II or one Type III
■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■
Pointing stick	Touch pad	Touch pad	Touch pad and pointing stick	Pointing stick
Lithium ion	Nickel hydride	Lithium ion	Lithium ion	Lithium ion
8:00-12:00, 4:00	6:00, 3:00	5:30, 4:30	4:00, 2:00	4:00, 2:00
■ ■	■ ■	■ ■	■ ■	■ ■
No set policy	3	15; 2 if adjacent; 4 if within a 1-inch square	12; 5 if clustered	12; 5 if clustered
3 years/3 years	1 year/1 year	1 year/1 year	1 year/1 year	1 year/1 year
N/A	N/A	N/A	N/A	N/A
■	■	■	■	■
■	■	■	■	■

the floppy disk drive in the main unit and another fitting in a special bay in the Mobile CD unit. All three batteries in place give you a claimed 9-hour battery life. On our BatteryMark test, with a single battery, the unit lasted 2:29. Sheer benchmark test performance isn't a strong point with the 4131T: The unit had below-average results on every test except for its CD-ROM WinMark score, which was average.

Targeted as a power user's notebook and destined to double as a desktop replacement, the Armada 7750MT (travel weight 8 pounds) deserves close attention. With top-level Winstone and Graphics WinMark scores, thanks to its 166-MHz Pentium MMX CPU, the flagship Compaq doesn't look back. Its lithium ion battery life is also impressive: 3:31 on our BatteryMark test. The optional 8X CD-ROM drive, included in the price, fits in a modular drive or battery bay; the 7750MT also integrates a 33.6-Kbps modem and an AC adapter.

All units have IrDA ports, and both the 4131T and the 1520DM feature NTSC line-out ports. With performance profiles to fit their intended users, the Compaq Armadas are right on target.—
Bruce Brown

Armada 7750MT. Street price: \$6,550. **Armada 1520DM.** Street price: \$2,200. **Armada 4131T.** Street price: \$3,000. Compaq Computer Corp., Houston; 800-345-1518, 281-370-0670; fax, 281-518-1442; www.compaq.com.

Dell Computer Corp.

Latitude XPi CD M166ST, Latitude LM M166ST



Dell Computer Corp.'s two notebook lines are aimed at buyers seeking portable multimedia performance systems. The \$3,619 (direct) value-class Latitude LM M166ST, an Editors' Choice, is a top choice for users who travel often. And the \$5,019 (direct) high-end Latitude XPi CD M166ST offers easy network connectivity. Both units were good performers on our benchmark tests.

The Latitude LM M166ST (travel weight 7.7 pounds) offers high performance compared with that of other value-class notebooks; it has the category's best Graphics WinMark score. Its lithium ion

battery posted 2:22 on our test.

The LM's moderate price tag includes a 33.6-Kbps PC Card modem, a 166-MHz Pentium MMX CPU, and a 12.1-inch active-matrix SVGA display. An additional battery fits into a modular bay otherwise used for the floppy disk drive or 10X CD-ROM drive; the floppy disk drive can also be attached externally via an included cable. The LM shares many physical characteristics with the 166-MHz MMX Sceptre Technologies SoundX 4500.

The Latitude XPi CD M166ST (8.3 pounds travel weight) is a three-spindle machine with a 10X CD-ROM drive, a floppy disk drive, and a hard disk installed simultaneously. The XPi packs the same modem, display, and CPU as the LM, then goes on to include Dell's Advanced Port Replicator, which has an integrated SCSI-2 controller and a 10Base-T Ethernet or Token-Ring network interface. The XPi can hold both a Type III and a Type II card concurrently, and it offers four speakers with user-selectable 3-D FM synthesis, and wavetable sound support.

Dell's power management software lets users configure peripherals to favor performance or battery conservation. The unit was a mostly average performer. Its lithium ion battery lasted an impressive 3:14 on our BatteryMark test.

A high value because of its performance, features, and support, the Latitude LM M166ST is a fine system for users who want a moderately powerful multimedia system. For even higher performance levels, full-time access to three drive types, and quick hookups to networks, the Latitude XPi CD M166ST is a connected user's dream.—BB

Latitude XPi CD M166ST. Direct price: \$5,117. **Latitude LM M166ST.** Direct price: \$3,926. Dell Computer Corp., Round Rock, TX; 800-388-8542, 512-338-4400; fax, 512-728-3653; www.dell.com. Circle 467 on reader service card.

DFI DFI 8120

The DFI 8120 (\$4,000 street) is a powerful high-end modular unit with full multimedia capabilities. With an extensive list of options, it more than adequately covers a mobile user's needs.

Designed as a full presentation unit, the system features a 12.1-inch TFT screen and a video-out jack with an available video-capture module that lets users attach a video camera for teleconferencing. The 8120's Pentium MMX/200 CPU helped it nab scores that were mostly above average.



DFI 8120, Digital HiNote VP 575.

The 8120, similar to the Jetta JetBook 7000+, has a travel weight of 8.5 pounds, but users may need to carry more, since the unit only lasted 2:02 on our BatteryMark test. An extra 1-pound lithium ion battery, with power gauge lights, is \$200.

The 8120 is a highly modular unit. Its bays can accommodate the battery, the floppy disk drive, the internal AC adapter, or the CD-ROM drive. The floppy disk drive and the AC adapter can also

SUITABILITY TO TASK

	Desktop replacement	Road warrior
DFI 8120	Good	Good
Digital HiNote VP 575	Good	Good

be used externally via cables. The 2.9GB hard disk slides out easily and can be locked into place. An integrated 33.6-Kbps modem is also included.

We had two minor complaints: The port covers do not retract, which increases the chances that they'll break, and the keyboard feels rickety. That aside, the unit does offer good performance and maximizes the number and kind of com-

ponents you can attach at one time.—FJE
DFI 8120. Street price: \$4,000. DFI, Fremont, CA; 800-334-1196, 510-657-5678; fax, 510-657-5685; www.dfiusa.com. Circle 468 on reader service card.

Digital Equipment Corp.

HiNote VP 575

In an effort to save space without compromising functionality, Digital Equipment Corp. has developed a combination drive that incorporates both the floppy disk and 12X CD-ROM drives. This unique technology is available in the company's

HiNote VP 575 (\$4,890 street), an adept high-end system. With DMI support and a bundled copy of Digital's ClientWorks network management software, the HiNote is appropriate for medium-to-large enterprises as well as SOHO environments.

This machine features a 12.1-inch TFT SVGA screen driven by a Neo-Magic graphics chip set with 1.1MB of DRAM. This chip set led the way

to clear graphics and an above-average Graphics WinMark score. Its Winstone score was also above average, thanks to a 166-MHz mobile Pentium MMX processor and Intel's 430MX chip set. All other scores were average. Its lithium ion battery lasted 2:42 on our test.

Slim at 1.8 inches, this 7.8-pound (travel weight) system offers FM and wavetable synthesis, a 4-Mbps infrared interface, and a comfortably situated touch pad. The

unit's modular bay supports either a second battery (\$280 extra) or the floppy disk/CD-ROM device. Puma Technology's Trans-Xit infrared software, a suite of

audio tools, and the XingMPEG Player are bundled with the system.

Great performance and unique components ensure that the Digital is worth the price.—CM

HiNote VP 575. Street price: \$4,890. Digital Equipment Corp., Maynard, MA; 800-344-4825, 508-493-5111; fax, 508-493-7374; www.windows.digital.com. Circle 469 on reader service card.



PROJECTING A BETTER IMAGE: VOLUME TWO

*What you do speaks
so loud that I cannot hear
what you say.*

Ralph Waldo Emerson



In speaking situations, over half of the total impact that you make on an audience is determined not by what you say, but by what you do. Your posture. Your gestures. Your facial expressions. Even your eyes. Each of them is capable of sending a strong message to your audience, and it may not necessarily be a message that you want to convey.

Yet body language can also be your best ally during a presentation. In fact, with some simple do's and don'ts, body language can actually help you become both a more effective and a more persuasive communicator.

You delivered your speech exactly as planned. But do you have any idea what you really said?

Body language that speaks volumes. No means of nonverbal communication is more articulate than the eyes. When used properly during a presentation, your eyes can reflect sincerity and conviction of message.

All while making each person in your audience feel you're speaking only to them. For small groups, make eye contact



with everyone, but only for a few seconds at a time. Any longer can make some people feel self-conscious. For larger groups, make eye contact with one section of the audience at a time. But avoid developing a mechanical left to right, right to left pattern. By randomly alternating sections, you'll appear more natural.

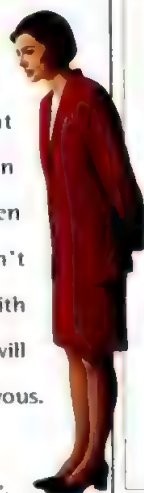
Posture.

Your audience will judge you before you say a word. They'll do so simply by looking at the way you stand and hold your arms. For that reason, you'll want to avoid the following speaking stances.



•The Soldier "At Ease" Stance.

This is crossing your hands behind your back, as if you had just been given the "at ease" command in the military. It often suggests you don't know what to do with your hands, which will make you look nervous.



•The "Defiant" Stance.

This is crossing your arms on your chest. Some read this as defiant or defensive. Others may feel you're not being open and honest.

•The "Adam and Eve" Stance.

This is crossing your hands in front of you, like a fig leaf. It looks as if you have something to hide.

•The "Mannequin" Stance.

This is hands on hips, as if

you're modeling clothing in a department store window. It makes you appear rather inexperienced and nervous.

The Proper Stance.

Stand with your feet slightly apart and arms at your sides. From this neutral position, move and gesture freely. If you find yourself in one of the negative stances we mentioned earlier, or if you are unsure what to do with

DISTRACTING MANNERISMS

1. Not standing up straight
2. Not looking up at the audience
3. Clinging to the podium
4. Being as stiff as a statue
5. Swaying side to side

your hands, just return to the neutral position.

Facial Expressions.

Before anyone will believe your message, you have to look as

though you truly

believe it yourself.

The trick is to think only about

what you are saying.

If you focus on anything else, like being nervous,

your expression won't match your message and you will lose credibility.

Besides, what you think is a

pleasant expression may not appear that way to



"It's nice to be here today."



"It's nice to be here today."



Audiences find pointing to be threatening.

your audience. As a test, simply practice in a mirror. If you're like most people, you'll need to smile much more than you think in order to look friendly.

Hand Gestures.

While gestures should be natural, the following will help you use them to your advantage. First, don't repeat the same gesture over and over, as this can become distracting to your audience. Secondly, if you gesture outward, turning your palms upward will

provide a more positive feeling.

Finally, if your audience is large,

you will also want to make

your gestures larger for those seated in the back.

An LCD projector that speaks for itself. Like the right body language, the right LCD projector can also have a positive effect on your presentation. Which is where our VPL-S500U portable LCD projector comes in. It offers the bright, uniform images you need for a professional presentation. With no hot spots or darkened corners. Everywhere you look on the screen, your image will be both bright and true.

SONY

To learn more, call 1-800-472-7669, ext. LCD.



A brief presentation on our LCD projectors.



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VPL-S800Q/VPL-V8000



VPL-W4000

Including the VPL-S500U, there are five LCD projectors in our LCD family.

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VPL-S500U Optional Accessories



PSS-500 Ceiling Mount

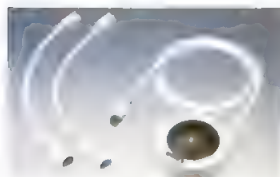


VLC-500 Soft Case

VPL-S500U Standard Accessories



RM-PJM500
Wireless Remote Commander® Unit



RM-PJ21
Wireless Mouse Receiver

With the advantages listed here, our VPL-S500U LCD projector can turn any meeting room, training room or classroom into a multimedia presentation forum.

1. A Brilliant Image. Light output of 450 ANSI lumens (VPL-S500U only) offers spectacular brightness. Even on large screens in rooms with ambient light.

2. A Consistent Image. Our newly developed optical unit and 250W DC drive metal halide lamp combine to provide uniform brightness and color from corner to corner.

3. A Portable Image. Since the VPL-S500U is compact and light, it travels easily for out-of-town presentations.

4. An Image That's Easy to Project. Just hook up a compatible signal source with the supplied cable (and adapter for Macintosh® computers). From there, the joystick-type Remote Commander® unit and on-screen display menus make any final setup and adjustments quick and simple.

5. An Image We Stand Behind. All our LCD projectors have a 3-year/3-year warranty on parts and labor, as well as a 90-day lamp warranty. (See actual warranty for details.) Our wireless Remote Commander unit and wireless mouse receiver are standard (VPL-S500U). Soft case, hard case, ceiling mount and replacement lamp are optional.

VPL-S500U Specifications

Projection system:

3 LCD panels, 1 lens,
projection 1.3-inch
p-Si TFT LCD panel,
1,557,504 pixels
(519,168 pixels x 3 panels)

Resolution:

RGB

True SVGA resolution

832 x 624 pixels

Advanced Scan Conversion (ASC)
for XGA signals

1024 x 768 pixels

Video

600 TV lines

Lamp:

250W metal halide lamp

Screen coverage:

40 to 300 inch

Light output:

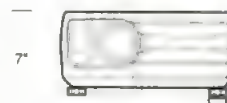
ANSI: 450lm

Weight:

22 lbs.

Dimensions:

VPL-S500U



14 1/2"



17 7/8"

mm = 368(W) x 176(H) x 455(D)

inches = 14 1/2(W) x 7(H) x 17 7/8(D)

To learn more, or to purchase a VPL-S500U or any of our LCD projectors from any of our select Sony resellers, call 1-800-472-7669, ext. LCD. Or visit our web site at <http://www.sony.com/professional>.

Available on/under GSA contract #GS-03F-4114B



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SONY

EMPaC International Corp.

Classic 5166 Notebook

For \$3,170 (street), EMPaC International Corp.'s Classic 5166 Notebook offers an appealing array of multimedia and connectivity features. The 166-MHz Pentium-based value-class unit performed well on our benchmark tests. EMPaC manufactures its own lines of notebooks and desktops and also provides Internet and intranet hardware and software.

The 8.3-pound (travel weight) Classic 5166 Notebook offers an 11.3-inch active color display driven by a Trident Cyber 9385 graphics chip set with 2MB of DRAM. Components included a 2GB hard disk, a fixed 10X CD-ROM drive, and a touch pad. The system, which supports Zoomed Video PC Card devices, also came with an integrated 33.6/14.4-Kbps voice modem as well as an Ethernet PC Card and connector cables.

Besides standard I/O ports, the unit provides a full set of audio connectors, an infrared port, an NTSC video-out port, and a docking station/port replicator connector. Also bundled with the unit was Puma Technology's TranXit file-transfer software and TouchStone Software Corp.'s PC-cillin antivirus software.

The 5166 posted average scores on all of our benchmark tests except the CD-ROM WinMark 97 tests, where it was an above-average performer. The system's lithium ion battery lasted a solid 2:40 on our BatteryMark test.

A good price and solid performance recommend this EMPaC system.—**RSA Classic 5166 Notebook.** Street price: \$3,170. EMPaC International Corp., Fremont, CA; 800-938-8878, 510-683-8800; fax, 510-683-8662; www.empac.com. Circle 470 on reader service card.

EPS Technologies Inc.

Apex XL-200MMX

For \$3,895 (direct), the high-end Apex XL-200MMX, from EPS Technologies, offers a full set of components and a rugged design. Based on a 200-MHz Pentium MMX CPU with 512K of L2 cache and similar to its high-end competitors from FutureTech Systems, Keydata International, and Micro X, the Apex is amply equipped to perform all the functions business users will need.

Weighing in at a travel weight of 10 pounds, the Apex unit was a mostly aver-

reasonable choice.—**JL**

Apex XL-200MMX. Direct price: \$3,895. EPS Technologies Inc., Omaha, NE; 800-447-0921, 402-895-2440; fax, 402-891-9383; www.epstech.com. Circle 471 on reader service card.

Everex Systems Inc.

StepNote MX

Everex Systems' StepNote MX is at the high end of our value notebook category. Based on a 166-MHz Pentium MMX, it delivered mostly above-average performance, while its features and con-

struction belie the \$2,800 street price. Late in the review cycle, however, Everex gave us conflicting information about pricing and availability, saying that our tested configuration was not available but that a version with a 12.3-inch display was available for \$600 more. Everex later said both versions will be available.

In the 7.9-pound (travel weight) Step-

Note, the floppy disk drive, CD-ROM drive, and secondary battery share a single expansion bay; choose one before you boot up. The primary battery has built-in indicators that show its current charge. The unit takes either a lithium ion or nickel hydride battery; we received the latter. It lasted 2:32 on our BatteryMark test.

Thanks to Synaptics software, the touch pad is adjustable. Stereo speakers and a built-in microphone add multimedia to the 11.3-inch TFT SVGA display. A 33.6-Kbps PC Card modem and two stacked CardBus slots, one with Zoomed Video, are included. The rear-panel ports are not covered.

An appealing price and a full set of features make this unit a contender.—**WR**

StepNote MX. Street price: \$2,800. Everex Systems Inc., Fremont, CA; 800-342-4536, 510-498-1111; fax, 510-683-2062; www.everex.com. Circle 472 on reader service card.



EMPaC Classic 5166 Notebook, EPS Apex XL-200MMX, Everex StepNote MX.

age performer for its class, though it earned an above-average CPUmark score. Its Chips and Technologies graphics chip set led to a below-average Graphics WinMark result, however. During hands-on video testing, the unit performed cleanly, producing true simultaneous external display without needing to reboot. Its lithium ion battery (EPS includes a spare) lasted only 1:20 on our BatteryMark test.

The Apex comes with a 13.3-inch TFT XGA screen, a 33.6-Kbps PC Card modem, an out-of-box battery charger, and a special car adapter. EPS bundles the unit with Microsoft Office Professional 97.

While other systems may provide more value for the money, the Apex is a

SUITABILITY TO TASK

	Desktop replacement	Road warrior
EMPaC Classic 5166 Notebook	Good	Good
EPS Apex XL-200MMX	Good	Good
Everex StepNote MX	Good	Good



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Fosa Computer Inc.

Fosa AP 6300T

They say you can't take it with you, but Fosa Computer gives it a try with the AP 6300T (\$3,200 direct). The high-end 200-MHz Pentium MMX unit offers many hardware features and competitive performance. It is similar to the reviewed Broadax NP6280A and the Chem USA ChemBook 6800.

The AP 6300T has a 12.1-inch TFT display, a removable 2GB Toshiba hard disk, and three Type II PC Card slots. Two slots are stacked on the right side and can hold a single Type III device. The unit's 12X CD-ROM drive is fixed, but the floppy disk drive can be swapped for an extra battery. The AP 6300T also offers MIDI and standard IR ports, as well as a full set of audio ports.

By squeezing all this into the case, however, the AP 6300T ends up with a hefty travel weight of 8.8 pounds. Its lithium ion battery lasted just 1:32 on our BatteryMark test. Also bundled with the unit is a 33.6-Kbps PC Card fax modem.

The unit posted average scores on most of our tests; exceptions were an above-average Graphics WinMark score and a below-average Disk WinMark score.

A lot of features are packed into this attractively priced machine, making it worthy of a closer look.—RSA

Fosa AP 6300T. Direct price: \$3,200. Fosa Computer Inc., South Plainfield, NJ; 800-216-3672, 908-753-6100; fax, 908-753-6616; www.fosa.com. *Circle 473 on reader service card.*

Fujitsu PC Corp.

LifeBook 531T, LifeBook 655Tx

Though the LifeBook 655Tx (\$4,000 street) is a subnotebook and the LifeBook 531T (\$2,500 street) is a value-class portable, they have more in common than their midnight-blue cases. Both are good values, offering competi-

tive performance and good prices.

Thin (1.2 inches) and light (5.4 pounds system weight, 6 pounds travel weight), the 655Tx is a capable Pentium MMX/150 multimedia unit with 16-bit stereo sound, separate Type II CardBus slots, a 1.3GB hard disk, and a 12.1-inch TFT SVGA screen. An included 1-pound lithium ion battery supplements the smaller built-in battery. Tested life was just 1:18 with both batteries (included in travel weight), so you might want a spare (\$280).

The 655Tx also includes an enhancement unit that nudges it into the high-end notebook class with an 8X CD-ROM drive, floppy disk drive, and joystick/MIDI port. The unit also has a separate, standard external floppy disk drive.

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Fosa AP 6300T	Good	Good
Fujitsu LifeBook 655Tx	Good	Good
Fujitsu LifeBook 531T	Fair	Fair
FutureTech FutureMate FM9702TA	Good	Good
FutureTech FutureMate FM4013D	Fair	Good

The more conventional 531T (8.3 pounds travel weight) has one modular bay for either a floppy disk drive, a 10X CD-ROM drive, or an extra hard disk or battery. The floppy disk module can be used externally. A port replicator is \$150.

The 531T also comes with an 11.3-inch TFT SVGA screen, a Pentium/133 CPU, a 1.3GB hard disk, and CardBus support. Its lithium ion battery lasted 2:31 on our test. The unit also did well on our benchmark tests, earning mostly average scores except for above-average scores on our Winstone and Graphics WinMark tests.

Both have touch pads, built-in 33.6-

Kbps modems, LCDs that show the charge of each battery separately, and three-year warranties.

The 655Tx can handle the role of subnotebook or high-end machine, though its battery life makes it less useful for a road warrior. If economy is your primary concern, the 531T deserves a look.—WR

LifeBook 655Tx. Street price: \$4,000. **LifeBook 531T.** Street price: \$2,500.

Fujitsu PC Corp., Milpitas, CA; 800-838-5487, 408-935-8800; fax, 408-935-1552; www.fujitsu-pc.com. *Circle 474 on reader service card.*

FutureTech Systems Inc.

FutureMate FM9702TA, FutureMate FM4013D

FutureTech Systems' FutureMate FM4013D (\$2,149 direct) is a respectable value-class system targeted for budget-bound home and corporate users. It features a 133-MHz Pentium CPU and an 11.3-inch DSTN SVGA screen, and it has good performance for its class. Stepping up to a 200-MHz MMX CPU and a 13.3-inch TFT screen, the FutureMate FM9702TA (\$3,799 direct), intended as a power user's system, also has competitive performance and a compelling price.

Both FutureTech systems have infrared ports, 33.6-Kbps PC Card modems, and swappable floppy disk drives and CD-ROM drives. The 7.7-pound (travel weight) FutureMate FM4013D also comes with a 1.3GB hard disk and a NeoMagic graphics chip set. This chip set helped the unit earn an above-average Graphics WinMark score, which in turn buoyed its Winstone score to above average as well. Other scores were average. Its lithium ion battery lasted 2:42 on our BatteryMark test.

The 8.2-pound (travel weight) FutureMate FM9702TA boasts a stunning 13.3-inch TFT XGA screen. Like the EPS Apex XL-200MMX, Keydata KeyNote 8660 XP, and Micro X MX Edge machines, the FM9702TA has a slight bulge

on the bottom of the case for the integral fan that its 200-MHz CPU needs. The unit also has a video-in jack that supports both NTSC and PAL formats and uses Chips and Technologies Chips-TV software for video captures. FutureTech sells a video-conferencing kit for \$595.

The FM9720TA is an average performer except for its below-average scores on our Disk and Graphics WinMark tests. Its lithium ion battery lasted a disappointing 1:33 on our BatteryMark test.

The FM4013D is a fine system for those who don't need a large active-matrix screen; in return you get better battery life. For a solid, workhorse presentation notebook, consider the FutureMate FM9720TA.—**BB**

FutureMate FM9720TA. Direct price: \$3,799. **FutureMate FM4013D.** Direct price: \$2,149. FutureTech Computer Systems, Hackensack, NJ; 800-275-4414, 201-488-4414; fax, 201-488-4405; www.futuretec.com. Circle 475 on reader service card.

Gateway 2000 Inc.

Solo 9100 S5-166, Solo 2200 S5-133



Gateway 2000 shows off its design expertise in both the value 133-MHz Pentium Solo 2200 S5-133 (\$3,074 direct) and the high-end 166-MHz Pentium MMX Solo 9100 S5-166 (\$5,599 direct). Both offer stellar features, great battery life, and good performance; both are Editors' Choices. The Solo 2200 is in the middle of Gateway's value notebook line, while the Solo 9100 is the new flagship muscle portable.

The Solo 9100 (9.2-pound travel weight) is a showcase of innovation, starting with its combination CD-ROM/floppy disk drive module, which can be swapped for an extra battery (included). This is the first unit we've seen with Intel's new Mobile Module, which incorporates the CPU, L2 cache, PCI chip set, and other

key circuitry. The unit has a 13.3-inch TFT XGA display run by a 64-bit Chips and Technologies graphics chip set with 4MB of EDO DRAM, the most video memory of any unit in this roundup.

The Solo 9100 also comes with a removable 2.9GB hard disk and a full set of I/O connections, including full audio, two USB, NTSC video-in and video-out, MIDI, and 4-Mbps IR ports.

The Solo 2200 (6.9-pound travel weight) offers a 12.1-inch SVGA TFT display, a Chips and Technologies graphics

2000, 605-232-2000; fax, 605-232-2023; www.gw2k.com. Circle 476 on reader service card.

Hewlett-Packard Co.

HP OmniBook 5700CTX, HP OmniBook 2000, HP OmniBook 800CT

Hewlett-Packard Co. targets the corporate market and is likely to attract a following for each of its new notebooks. All three systems—the high-end

HP OmniBook 5700CTX (\$5,690 street), configured with a 166-MHz MMX processor; the value HP OmniBook 2000 (\$3,710 street) with a 133-MHz Pentium MMX CPU; and the diminutive HP OmniBook 800CT subnotebook (\$4,750 street), using a Pentium/166 CPU—are loaded with features sure to appeal to business buyers.

The top of the HP notebook line is the 5700CTX (7.9-pound travel weight). Loaded with 512K of L2 cache, this no-compromise system is a full desktop replacement. The unit has some nice design touches, such as a small pop-out handle to extract the 10X CD-ROM or floppy disk drive, and a place for a business card on the bottom. The unit's 12.1-inch TFT XGA screen is driven by a Chips and Technologies CT65554 chip set. This chip set was also partly responsible for a below-average Graphics WinMark score. The unit's other test scores were average. Its battery lasted 2:21 on our test.

The 2000 (7.7-pound travel weight) is a good general-purpose system with a 12.1-inch TFT SVGA display. It shares the basic design of the 5700CTX, has the same thoughtful touches, and uses the same docking station. The 2000's lack of an L2

cache, however, contributed to below-average scores on our CPUmark and Graphics WinMark tests. An above-average Disk WinMark score, thanks to a 2GB Toshiba hard disk, kept the unit's Winstone score within the average range. The unit's



chip set with 2MB of VRAM, and a 10X CD-ROM drive that can be swapped for a floppy disk drive or an extra battery. Gateway says the Solo 2200 will be supplanted later this summer by the Solo 2300, a similar model with enhanced video.

The units use lithium ion batteries and posted great BatteryMark times: 2:52 for the Solo 9100 and 2:48 for the Solo 2200. On our benchmark tests, the Solo 2200 garnered average scores, while the Solo 9100 earned mostly above-average scores save for average disk and CPU results.

Both Solos come with 33.6-Kbps fax modems. The Solo 9100 comes with Microsoft Office 97 Small Business Edition; the Solo 2200 has Microsoft Works.—**RSA**
Solo 9100 S5-166. Direct price: \$5,599. **Solo 2200 S5-133.** Direct price: \$3,074. Gateway 2000 Inc., North Sioux City, SD; 800-846-

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Gateway Solo 9100 S5-166	Excellent	Excellent
Gateway Solo 2200 S5-133	Good	Good
Hewlett-Packard OmniBook 5700CTX	Good	Good
Hewlett-Packard OmniBook 2000	Good	Good
Hewlett-Packard OmniBook 800CT	Fair	Good



JERRY LEWIS

actor
comedian
director
charity spokesperson



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- ▶ 32-bit PC CardBus and Zoomed video support

NEC

battery lasted a good 2:49 on our test.

The compact 800CT (4.8-pound travel weight) packs big notebook features, including 512K of L2 cache. Its 10.4-inch TFT SVGA screen can handle 65,536 colors and can display at XGA resolution with 256 colors externally. The unit did well on our tests, earning above-average scores in its class on our Winstone, CPUmark, and Graphics WinMark tests and keeping up with the competition on the other tests. The 800CT's distinctive pop-out HP mouse-on-a-stick has as many critics as fans, but its combination of full power and small size endears it to many who want performance without weight and bulk. The 800CT lasted 1:53 on our BatteryMark test.

All three notebooks have lithium ion batteries, IR ports, and three-year warranties. All ship with HP's excellent DMI implementation program, HP TopTools 2.0 (which monitors system components and status), to ensure a controlled fit in networks. Buyers who count on HP's reputation for quality, reliability, and service and are less concerned about initial cost are sure to be pleased by this lineup.—BB

HP OmniBook 5700CTX. Street price: \$5,690.
HP OmniBook 2000. Street price: \$3,710. **HP OmniBook 800CT.** Street price: \$4,750. Hewlett-Packard Co., Palo Alto, CA; 800-322-4772; fax, 800-333-1917; www.hp.com/go/omniobook. Circle 477 on reader service card.

Hitachi PC Corp.

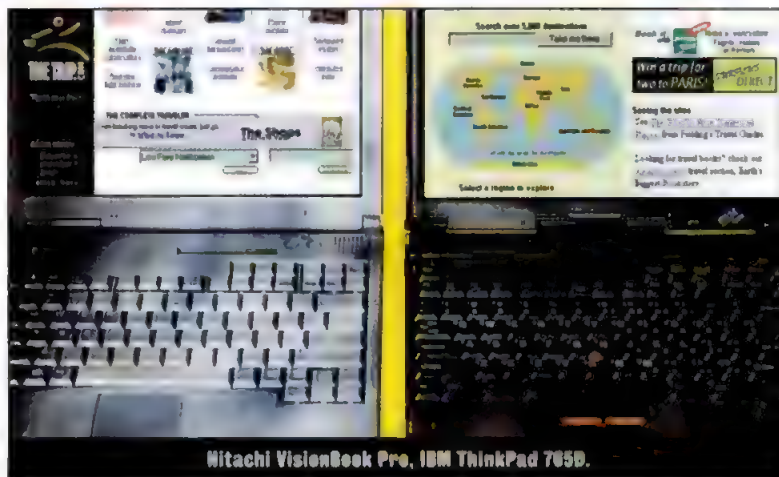
VisionBook Pro

When it comes to connectivity, Hitachi PC Corp.'s VisionBook Pro power notebook (\$5,500 street) has the bases covered, featuring a built-in 56.6-Kbps U.S. Robotics voice modem with a phone jack and cellular phone connector plus an integrated 10-Mbps Ethernet card with a 10Base-T port. The 166-MHz Pentium MMX unit held its own on our benchmark tests. All of Hitachi's VisionBook line of notebooks feature modular designs, light-

weight carbon-fiber cases, and integrated communications features.

The VisionBook Pro (8.3-pound travel weight) comes with a 13.3-inch XGA TFT display and a 2.1GB hard disk. Its CPU is mounted on a proprietary daughtercard, which includes 512K of L2 cache and should facilitate future upgrades. The unit also has infrared and USB ports.

The system includes 10X CD-ROM drive and floppy disk drive modules that can be swapped for lithium ion batteries but not for each other. The floppy disk module can be used externally. The unit also comes with Traveling Software's



Nitachi VisionBook Pro, IBM ThinkPad 765D.

LapLink for Windows 95.

The unit lasted a respectable 2:19 on our BatteryMark test. Benchmark test scores were also good, with two notable highlights: above-average scores on our CPUmark and CD-ROM WinMark tests.

Hitachi is also readying the VisionBook Elite subnotebook (5.9-pound travel weight), which features a 13.3-inch TFT XGA display. (See this issue's PC Trends section for details.)

Excellent communication features and solid performance make the VisionBook Pro a worthy contender.—RSA

VisionBook Pro. Street price: \$5,500. Hitachi PC Corp., San Jose, CA; 800-555-6820, 408-321-5216; fax, 800-555-9621; www.hitachipc.com. Circle 478 on reader service card.

IBM Personal Computer Co.

ThinkPad 765D, ThinkPad 380D, ThinkPad 560E



As usual, IBM is spanning the notebook market with a trio of adept ThinkPads. Though somewhat expensive at \$4,120 (street), the ThinkPad 380D (7.6 pounds travel weight) is a leading performer in our value category. In the subnotebook market, IBM offers the \$4,800 ThinkPad 560E.

Light (6.2 pounds travel weight, not including CD-ROM drive) and thin (1.2 inches), the 560E has been the defining product in the category for the better part of a year and is our Editors' Choice. IBM's high-end machine, the \$6,500 ThinkPad 765D, did not stack up as well against the competition as past 700 models did, but it is still one of the finest designs in the industry.

The 765D has an NTSC video-out port (adapter required but not included); a 28.8-Kbps internal modem (software-upgradable to 33.6 Kbps via IBM's Web site); IBM's Mwave digital signal processor (DSP), which provides excellent sound and myriad telephony functions; a MIDI port; and CardBus support. The unit's floppy disk drive is external only; the 8X CD-ROM drive is fixed.

The 560E's floppy disk drive and optional 4X CD-ROM drives (\$400, included in price above) must be used externally (with an included PC Card), but the base system is only 4.1 pounds. An NTSC video-in port and a 33.6-Kbps PC Card modem with built-in RJ-11 jack are also included.

The 765D and the 560E each use a 166-MHz Pentium MMX with Intel's 430MX chip set. Both were respectable performers, though their CD-ROM drives earned below-average scores on our CD-ROM WinMark tests. The 765D also scored below average on our Graphics WinMark tests,

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Hitachi VisionBook Pro	Excellent	Good
IBM ThinkPad 765D	Good	Good
IBM ThinkPad 380D	Good	Good
IBM ThinkPad 560E	Good	Excellent

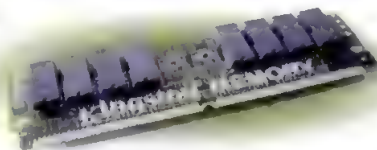


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thanks in part to its Trident graphics chip set. The 560E had a BatteryMark time of 2:10, solidly above average in its four-machine class. The 765D, however, lasted a disappointing 1:52.

With a 150-MHz Pentium MMX and Intel's 430MX chip set, the 380D earned the second-leading Winstone score in its class. Thanks to a 2.1GB IBM hard disk, the 380D's Disk WinMark score was the category's highest, while a NeoMagic chip set helped produce an above-average Graphics WinMark score as well. Battery time was an excellent 2:42.

Though the 380D has 16MB of RAM, only 14MB is dedicated to system memory in the default configuration. The other 2MB is used for the SystemSoft power management scheme. We disabled SystemSoft and used the entire 16MB for testing; performance will be slightly lower when power management is being used. IBM has outfitted the 380D with Zoomed Video support, fast infrared, and a 33.6-Kbps PC Card modem.

Users will be satisfied with any of these ThinkPads. All ship with Lotus SmartSuite and IBM's NetFinity network management software.—*CM*

ThinkPad 765D. Street price: \$6,500.
ThinkPad 380D. Street price: \$4,120.
ThinkPad 560E. Street price: \$4,800. IBM Personal Computer Co., Somers, NY; 800-426-2968, 914-766-1900; fax, 800-426-4329; www.pc.ibm.com. *Circle 479 on reader service card.*

Jetta International Inc.

JetBook 7000+, JetBook 6300CD

The JetBook 7000+ (\$3,651 list) is a proficient high-end system, while the value-class JetBook 6300CD (\$2,650 list) offers an appealing price but is a poor performer.

The 7000+ has a 200-MHz Pentium MMX CPU and a 2.9GB Toshiba hard disk. Similar in design to DFI's 8120, the 7000+ turned in an above-average

score on our Disk WinMark tests. Other scores were average, except for a below-average BatteryMark time of 2:00.

The 7000+ (9 pounds travel weight) has a pair of modular bays; each bay accommodates either the main nickel hydride battery, a floppy disk drive, a standard 10X TEAC CD-ROM drive, a second hard disk, a magneto-optical drive, or the AC adapter. Both the floppy disk drive (with a parallel-port cable) and the AC adapter can be used externally. The unit also has a 33.6-Kbps internal modem, an NTSC video-out port, and rear feet for typing on an incline. The system's touch pad functions well but would be better if it were centered under the Spacebar.

Jetta's 6300CD is not quite as impressive as the 7000+. Although Intel has intro-

duced two new mobile Pentium/133s, Jetta has opted for the 3.3-volt desktop version, which runs hotter and—in this environment—delivers weaker performance. The 6300CD had the lowest Winstone and Graphics WinMark scores of the roundup and below-average scores on most other tests. Only its CD-ROM WinMark score was average, thanks to an integrated 8X TEAC drive. The unit's nickel hydride battery lasted 2:05 on our BatteryMark test.

This 6300CD (8.7 pounds travel weight) is similar to the ARMNote TS97MX. It comes with an NTSC video-out port, a 33.6-Kbps PC Card modem, and an integrated floppy disk drive. The machine has

a door for a port replicator connection, but the motherboard does not support it. Either unit will get the job done, but the 7000+ is a better overall value.—*CM*
JetBook 7000+. List price: \$3,651. **JetBook 6300CD.** List price: \$2,650. Jetta International Inc., Monmouth Junction, NJ; 800-445-3882, 908-329-9651; fax, 908-329-0105; www.jetta.com. *Circle 480 on reader service card.*

Keydata International Inc.

KeyNote 8660 XP

Keydata International's KeyNote 8660 XP (\$4,395 direct), with a 200-MHz Pentium MMX CPU and a 13.3-inch TFT display, is a well-equipped notebook intended for multimedia presentation ap-

plications. Its test scores, however, were mostly below average for its class. The Keydata unit is nearly identical in design to the EPS Apex XL-200MMX, the FutureTech FutureMate FM9720TA, and the Micro X MX Edge, though it is slightly more expensive than the other brands.

With its 8.2-pound travel weight and integral fan mounted on the bottom of the case, the KeyNote is no lightweight, but it has a big,

beautiful screen with XGA resolution and 16-bit color. This model also has a video-in jack for composite video (both NTSC and PAL are supported).

The unit had below-average scores on all our tests except the CPU tests, where its score was average. The KeyNote can use either nickel hydride or lithium ion batteries (spares cost \$98 and \$188, respectively). We tested the unit with a lithium ion battery; its 1:20 time on our BatteryMark test was below average.

As a portable presentation system or even as a desktop replacement machine, the KeyNote 8660 XP will do the job. Just don't expect stellar performance.—*BB*

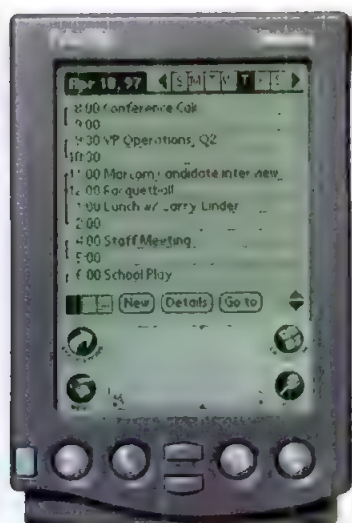
KeyNote 8660 XP. Direct price: \$4,395. Keydata International Inc., South Plainfield, NJ; 800-486-4800, 908-755-0350; fax, 908-756-7359; www.keydata-pc.com. *Circle 481 on reader service card.*



Jetta JetBook 7000+, Keydata KeyNote 8660 XP.

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Jetta JetBook 7000+	Good	Good
Jetta JetBook 6300CD	Fair	Good
Keydata KeyNote 8660 XP	Good	Good



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Maximus Computers Inc.

Medianote CD Book

Maximus Computers' Medianote CD Book is equipped with little beyond the basics, and it earned below-average scores on our tests. But its no-frills features and lackluster performance come with a price to match: At \$2,199 (direct), it's one of the least expensive systems we saw. The Royal Mobile Best Buy is essentially the same unit with a faster CPU, but it costs nearly \$1,000 more.

The Medianote—which is 7.8 pounds (travel weight)—has a 166-MHz Pentium MMX CPU and a 10X internal CD-ROM drive, which won't leave you too far behind the technology curve. If you later upgrade the unit's 2GB hard disk, CPU, or memory, the operation should be easy and tool-free.

Although the Medianote's CPU is among the fastest-running in our roundup, it earned the lowest CPUmark₃₂ score. The unit's other test scores were also below average, save for an above-average CD-ROM WinMark 97 result, which was the second-highest in its class. We were unable to find any physical defects or improper setup in our review unit that could account for the CPU's poor performance; the Royal Mobile Best Buy, essentially similar to the Medianote, was by contrast an average performer. The Medianote's nickel hydride battery lasted only 1:46 on our BatteryMark test.

The unit also comes with Lotus SmartSuite 97. If an MMX CPU is high on your list and you don't want to pay a lot for it, the Medianote may be the answer. Just don't expect lightning-fast performance.—*Nancy Hirsch*

Medianote CD Book. Direct price: \$2,199. Maximus Computers Inc., Irwindale, CA; 800-888-6294, 818-815-7777; fax, 818-969-2775; www.maximuspc.com. *Circle 482 on reader service card.*

MaxTech Corp.

MaxTech YesBook Model 753Plus

Though the MaxTech YesBook Model 753Plus was a mostly above-average performer for its value class, it hardly carries a value-class price. But for \$4,000 (street), this unit—which is 8.4 pounds (travel weight)—affords end users a 166-MHz Pentium MMX CPU; Intel's latest mobile chip set, the 430MX; and a Neo-Magic graphics chip set, which yielded a terrific Graphics WinMark score.

The YesBook had above-average scores on most of our tests. Only its Disk WinMark and CD-ROM WinMark results were average. When compared with high-end units—which it more closely resembles in price—it was an average to below-average performer. The machine, after all, has only 16MB of memory (our high-end notebooks all had 32MB). Its lithium ion battery lasted 2:02 on our test.

Both good performance and well-implemented components recommend this unit.—*CM*

MaxTech YesBook Model 753Plus. Street price: \$4,000. MaxTech Corp., Cerritos, CA; 800-936-7629, 562-921-1698; fax, 562-802-9605; www.maxcorp.com. *Circle 483 on reader service card.*

Micron Electronics Inc.

TransPort XKE, TransPort VLX



Micron had success with its first notebook offering last year and continues to shine with the new TransPort XKE.

This machine, like last year's, wins our Editors' Choice. The XKE, which costs \$5,899 (direct), offers superlative design, construction, and performance despite its 9.1-pound travel weight. By contrast, its older sibling, the value-class TransPort VLX (\$2,427 di-

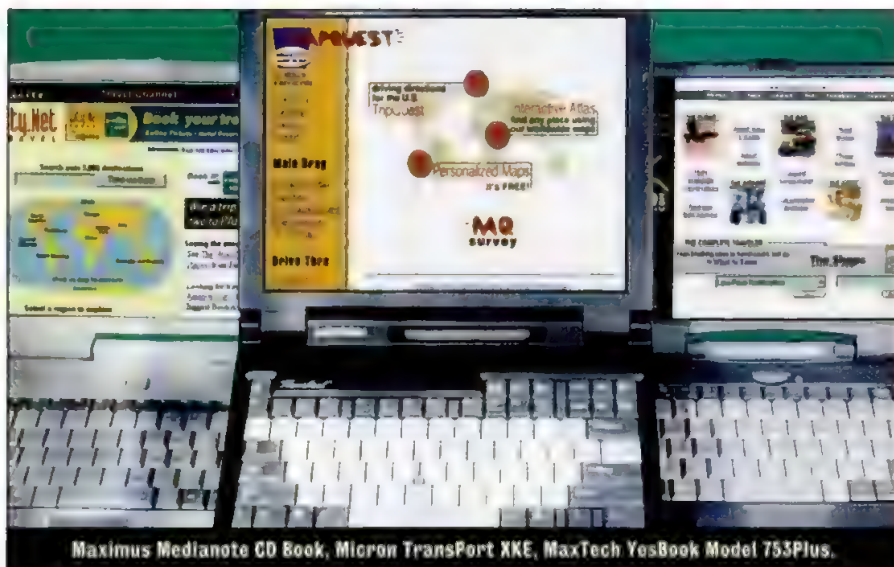
rect), falls just shy of the mark in almost every area.

The XKE earns its speed with a judicious choice of components: 128-bit video from Neo-Magic, a fast 2.9GB hard disk, and a 166-MHz mobile Pentium MMX CPU. These components pay off: The unit had above-average marks on all save the CD-ROM WinMark tests, where its score was average.

Using a lithium ion battery, it had an outstanding BatteryMark score of 4:09.

The unit has a 13.3-inch XGA TFT display, an excellent keyboard, and both a pointing stick and a touch pad you can switch between with a function key. The unit has composite video output, Zoomed

Video and CardBus support, an S-Video connector, and front and back IrDA. The floppy disk and CD-ROM drives are swappable, but you may want to leave the CD-ROM drive in because of its full multimedia controls. The



Maximus Medianote CD Book, Micron TransPort XKE, MaxTech YesBook Model 753Plus.

The unit is similar to the ACT NM5120VX and the Brick Ergo CD-PowerBrick³. It has both integrated floppy disk and CD-ROM drives and includes a MIDI port, an NTSC video-out port, and a 33.6-Kbps PC Card modem. The YesBook comes with Microsoft Office 97.

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Maximus Medianote CD Book	Good	Fair
MaxTech YesBook Model 753Plus	Good	Good
Micron TransPort XKE	Excellent	Excellent
Micron TransPort VLX	Good	Good

http://www.

"THE INTERNET'S TOO DARN SLOW."

"THERE'S NOTHING ON TV."

modular case facilitates upgrades. Our unit had a built-in 33.6-Kbps modem; 56.6-Kbps modems are now standard.

The 8.1-pound VLX is serviceable but not the star its sibling is. Its biggest problem is its 11.3-inch DSTN SVGA screen, which suffers from pronounced streaking. At VGA resolution, interpolated pixels make small characters difficult to read. The nickel hydride battery can be removed easily but may also be jammed improperly into place. Memory or hard disk access requires a screwdriver.

The VLX does have some good qualities: Its floppy disk and CD-ROM drives are swappable (we received only the CD-ROM drive), and it offers stereo sound. Performance was average throughout, and its battery lasted a solid 2:32 on our test.

Micron's XKE is worth its price. The VLX will get the job done, but its screen is a definite drawback.—WLR

TransPort XKE. Direct price: \$5,899. **TransPort VLX.** Direct price: \$2,427. Micron Electronics Inc., Nampa, ID; 888-634-8799; 208-893-3343; fax, 208-893-3424; www.micronpc.com. **Circle 484 on reader service card.**

Micro X MX Edge, MX Entre

Micro X's two new notebook computers, the aptly named \$2,095 value-class MX Entre and the \$3,995 high-end MX Edge (a presentation and desktop replacement system) are aggressively priced for their intended market segments. While neither is a performance leader, each has extra features that make it a clear bargain.

The high-end MX Edge, based on a Pentium MMX/200 chip, is worth its steep cost. When you run XGA resolution on the MX Edge's 13.3-inch screen, the fine image control and rich colors show that this system is set for on-the-road presentations. A video-in composite jack handles NTSC or PAL signals. The unit, which weighs 7.9 pounds (travel weight), has a modular drive design, but you can run the floppy disk

drive externally. This system is similar to the EPS Apex XL-200MMX, the Future-Tech FutureMate FM9720TA, and the Keydata KeyNote 8660 XP. The MX Edge is the least expensive of these products and boasts the largest hard disk (2.9GB).

The MX Edge posted average scores on most tests except the Graphics and CD-

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Micro X MX Edge	Good	Good
Micro X MX Entre	Fair	Good
MOS 200MMX Power User	Good	Fair

ROM WinMark tests. The MX Entre earned mostly below-average test scores for its class, however. Its only average result was on our Disk WinMark tests. Neither unit did well on our BatteryMark test: The MX Edge lasted 1:12, while the MX Entre lasted 1:41. Both use lithium ion batteries.

The MX Entre, which weighs 7.9 pounds (travel weight) and is based on a Pentium/166 chip, has a modular bay de-

MOS

MOS 200MMX Power User

The high-end MOS 200MMX Power User (\$3,449 direct), from MOS (formerly Mobile Office Systems), offers a good feature set and a particularly proficient CD-ROM drive.

Similar to the Broadax NP6280A, the ChemBook 6800, and the Fosa AP 6300T, this 10-pound unit carries a 200-MHz desktop Pentium MMX CPU and a 1.9GB Toshiba hard disk.

These components were largely responsible for the lithium ion battery's disappointing 1:32 time and the unit's below-average disk score. Other scores were average, save for an excellent CD-ROM result, thanks to the integrated TEAC 11X drive.

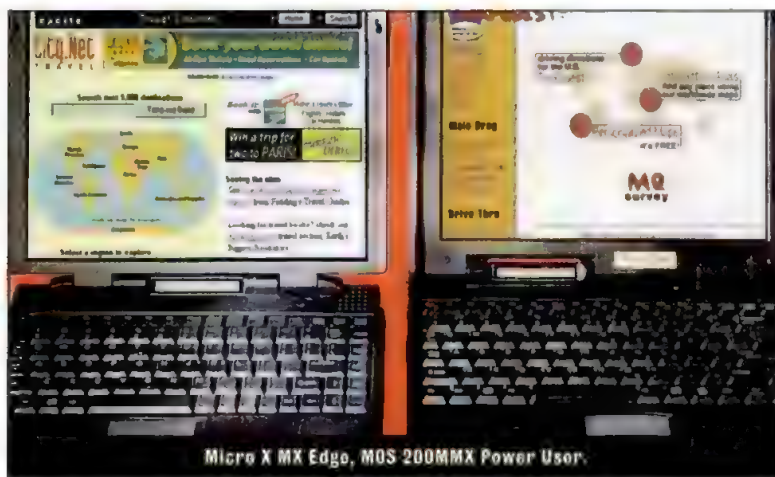
The unit's modular drive bay holds either a floppy disk drive or a second battery (nickel hydride or lithium ion). MOS also provides the system with a 33.6-Kbps PC

Card modem, an NTSC video-out port, and Card-Bus support.

The unit already has admirable components (a 12.1-inch screen, 2MB of graphics DRAM, and 256K of L2 cache), but MOS also offers an enhanced version for \$4,199 with a 13.3-inch screen, 4MB of graphics memory, 512K of L2 cache, a 16X CD-ROM, USB ports, and an optional magneto-optical drive for the modular bay.

A good price and appealing features make this a strong contender.—CM

MOS 200MMX Power User. Direct price: \$3,449. MOS, Fullerton, CA; 888-446-4667, 714-525-4090; fax, 714-525-4093; www.mos1.com. **Circle 486 on reader service card.**



sign for swapping drives or a second battery. The 2GB hard disk is larger than you'd expect. The case is well made but not as rugged as the MX Edge's; the battery cover detaches easily and so could be lost. The 11.3-inch DSTN SVGA display's image quality is average.

The MX Entre is a good choice for anyone looking for a low-cost utility notebook, despite its poor performance. The MX Edge's fine display and appealing price make it worthy of consideration.—BB

MX Edge. Direct price: \$3,995. **MX Entre.** Direct price: \$2,095. Micro X, Solon, OH; 800-644-4524, 216-498-3330; fax, 216-498-3522; www.microx.com. **Circle 485 on reader service card.**

NEC Computer Systems Division

Versa 6200MX, Versa 2650CD

The high-end 6200MX (\$6,350 street) and value-class 2650CD (\$2,500 street) may not score high on conventional tests—both are average performers—but you'll be pleasantly sur-

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prised to find they really work.

The 6200MX has everything you'd expect: a 166-MHz Pentium MMX chip, a 13.3-inch TFT XGA screen, and a 2.9GB hard disk. What separates it from the pack is a wealth of detail along with excellent integration. Its video controller supports up to 1,600-by-1,200 resolution on a simultaneous external display, as well as composite video (NTSC or PAL) output. The keyboard is responsive, and the VersaGlide touch pad can be fine-tuned with NEC's bundled utilities. NEC includes two stacked CardBus slots.

Customizability is the strong point of the 6200MX, which weighs 8.7 pounds (travel weight). Its drive bay, the VersaBay, lets you switch among a floppy disk drive, a 10X CD-ROM drive, a second hard disk, and an extra lithium ion battery—conveniently identical to the main battery. A single battery lasted only 2:02. A nice touch: The status panel shows remaining battery charge as a percentage of full operating time.

The 6200MX fared well on most of our benchmark tests and earned an above-average score on our CD-ROM WinMark tests. Its Graphics WinMark result was about average among XGA-only systems and below average among all high-end systems. The 2650CD had average results on nearly all tests and did especially well on our CPU tests. The 2650CD's nickel hydride battery lasted only 1:49, however.

The 2650CD trims its disk to 1.3GB, the MMX CPU to 150 MHz, and the screen to a 12.1-inch DSTN SVGA display. Both the 10X CD-ROM and floppy disk drives are built into the unit, which weighs 7.9 pounds (travel weight). Its keyboard is as responsive as its sibling's, but its touch pad isn't as customizable. A slide in the I/O ports' cover allows access to the port replicator connector with the door closed.

Choose one of these Versas for the same reason you would



select a doctor—not for price but for confidence in its abilities.—WLR

Versa 6200MX. Street price: \$6,350. **Versa 2650CD.** Street price: \$2,500. NEC Computer Systems Division, Boxborough, MA; 800-632-4525, 508-264-8000; fax, 508-635-4695; www.nec-computers.com. Circle 487 on reader service card.

Olivetti Computers Worldwide

Echos Pro 133S

When some PC makers squash down prices, they squeeze out features. Olivetti Computers Worldwide opted for the opposite strategy for its value-class Pentium/133-based Echos Pro 133S. It packed in extras such as a nice 12.1-inch TFT SVGA display, a built-in 33.6-Kbps modem, and Zoomed Video and NTSC/PAL video-out support, while holding the price to an appealing \$3,200 (street). Performance was mostly average. Note that Olivetti, primarily a European PC maker, reentered the U.S. PC market last spring. The company was recently sold to Piedmont International, which has decided to focus only on the European market. Olivetti systems will be available here through midsummer, and the company will provide support for the next three years.

SUITABILITY TO TASK

	Desktop replacement	Road warrior
NEC Versa 6200MX	Excellent	Good
NEC Versa 2650CD	Good	Good
Olivetti Echos Pro 133S	Good	Good
Royal Mobile Best Buy	Good	Good

The unit includes a bay-mounted 8X CD-ROM drive, and Olivetti plans to offer a second hard disk, which will slide into the modular bay and supplement the 2GB internal disk (no supplemental battery is available, however). The internal disk served the system well on our tests, helping it to an above-average Disk WinMark score. Its Graphics WinMark result was below average, however; other scores were average.

The case is nondescript and sturdy, with a moderate 7.8-pound travel weight. The LCD status panel under the screen includes a four-step battery charge indicator, invisible when the case is closed. On our test, the lithium ion battery lasted nearly 2 hours, below average for the system's class.

You'll get quite a bit for your money with Olivetti's Echos.—WLR
Echos Pro 133S. Street price: \$3,200. Olivetti Computers Worldwide, Austin, TX; 888-465-4838; fax, 512-490-2494; www.olivettipc.com. Circle 488 on reader service card.

Royal Computer Inc.

Mobile Best Buy

You might not expect a 200-MHz Pentium MMX CPU in a machine with a moniker like Mobile Best Buy, but that's what Royal Computer packs into its 9-pound, high-end heavyweight. The price, \$3,079, confirms the name, as does the performance, which was average. The Maximus Medianote CD Book is a similar unit.

The Best Buy doesn't skimp on features, starting with a 12.1-inch SVGA TFT screen. The unit also has an NTSC/PAL video-out port and built-in CD-ROM and floppy disk drives. The unit's touch pad is good, thanks to tune-up software from Synaptics. The system includes a wireless trackball-style mouse that works with the case's twin front and back 4-Mbps IrDA recep-



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tors (two AAA batteries are required).

The system used a nickel hydride battery (rather than lithium ion), and that shows: It managed only 1:39 on our BatteryMark test. Also, its battery indicator gives a minimal all-or-nearly-nothing status report. Removing the battery is a bit of a hassle. Even worse, the battery isn't labeled, so you can put it in back-

wards, and it's pressed against its contacts solely by a removable cover plate. Only the Type II CardBus slots are covered.

The unit was a good performer except for a below-average disk score. If you want a value-priced Pentium MMX/200, the Best Buy lives up to its name.—**WLR Mobile Best Buy.** Direct price: \$3,079. Royal Computer Inc., City of Industry, CA; 800-486-0008, 818-855-5077; fax, 818-330-2717; www.royalcomp.com. **Circle 489 on reader service card.**

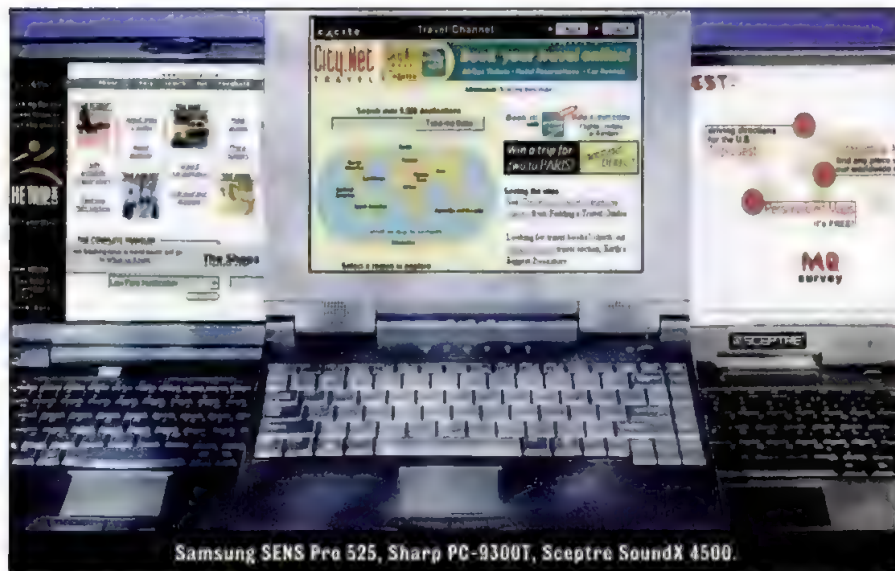
Samsung Electronics America Inc.

SENS Pro 525

When you make it yourself, you automatically have an advantage over companies that buy from you. Samsung exploits its status as one of the world's largest memory chip manufacturers by packing its high-end 150-MHz Pentium MMX-based SENS Pro 525 with 48MB of EDO DRAM. The company also builds the \$3,999 system's clear 12.1-inch SVGA TFT display, but that couldn't save it from poor graphics performance.

The SENS Pro's Cirrus Logic GD7548 graphics chip set kept its Winstone score below average as well. The unit did have an above-average CD-ROM WinMark score; its other scores were average.

The floppy disk and CD-ROM drives share a device bay in the case, which weighs 7.8 pounds (travel weight). Six LED indicators, partly visible with the case closed, provide system in-



formation but minimal battery-charge information. The unit also has two Type II CardBus slots and an odd, proprietary jack for the internal 33.6-Kbps modem. Samsung supplies an adapter to a modular telephone plug, assuming you'd rather pull out the adapter than destroy the case if you accidentally yank the phone cord while communicating. The lithium ion battery lasted an impressive 2:52 on our test.

The customizable Synaptics touch pad is easy to use. The SENS Pro is an appealing choice for those who don't require the utmost in graphics performance.—**WLR SENS Pro 525.** List price: \$3,999. Samsung Electronics America Inc., Ridgefield Park, NJ; 888-866-8372, 201-229-4000; www.sosimple.com. **Circle 490 on reader service card.**

Sceptre Technologies Inc.

SoundX 4500

Ano-nonsense high-end notebook with features rather than frills, the Pentium MMX/166-based SoundX 4500, from Sceptre Technologies (\$3,950 street), builds on multimedia roots. This unit is similar to Dell's Latitude LM M166ST.

Thanks in part to its NeoMagic 128-bit graphics chip set, the unit delivered above-average performance for its class on

in one removable module (though Sceptre offers nothing to take its place). You also get stereo sound, a built-in 33.6-Kbps modem, and CardBus support.

The unit's lithium ion battery lasted an impressive 2:42. This smart battery displays a five-level LED indication of its charge when you press a button. Under the screen, the LCD status panel serves as an even better battery monitor with an eight-segment display. Unfortunately, the status panel is covered by the lid.

Features and performance should make this Sceptre unit a contender.—**WLR SoundX 4500.** Street price: \$3,950. Sceptre Technologies Inc., City of Industry, CA; 800-788-2878, 818-369-3698; fax, 818-369-3488; www.sceptretech.com. **Circle 491 on reader service card.**

Sharp Electronics Corp.

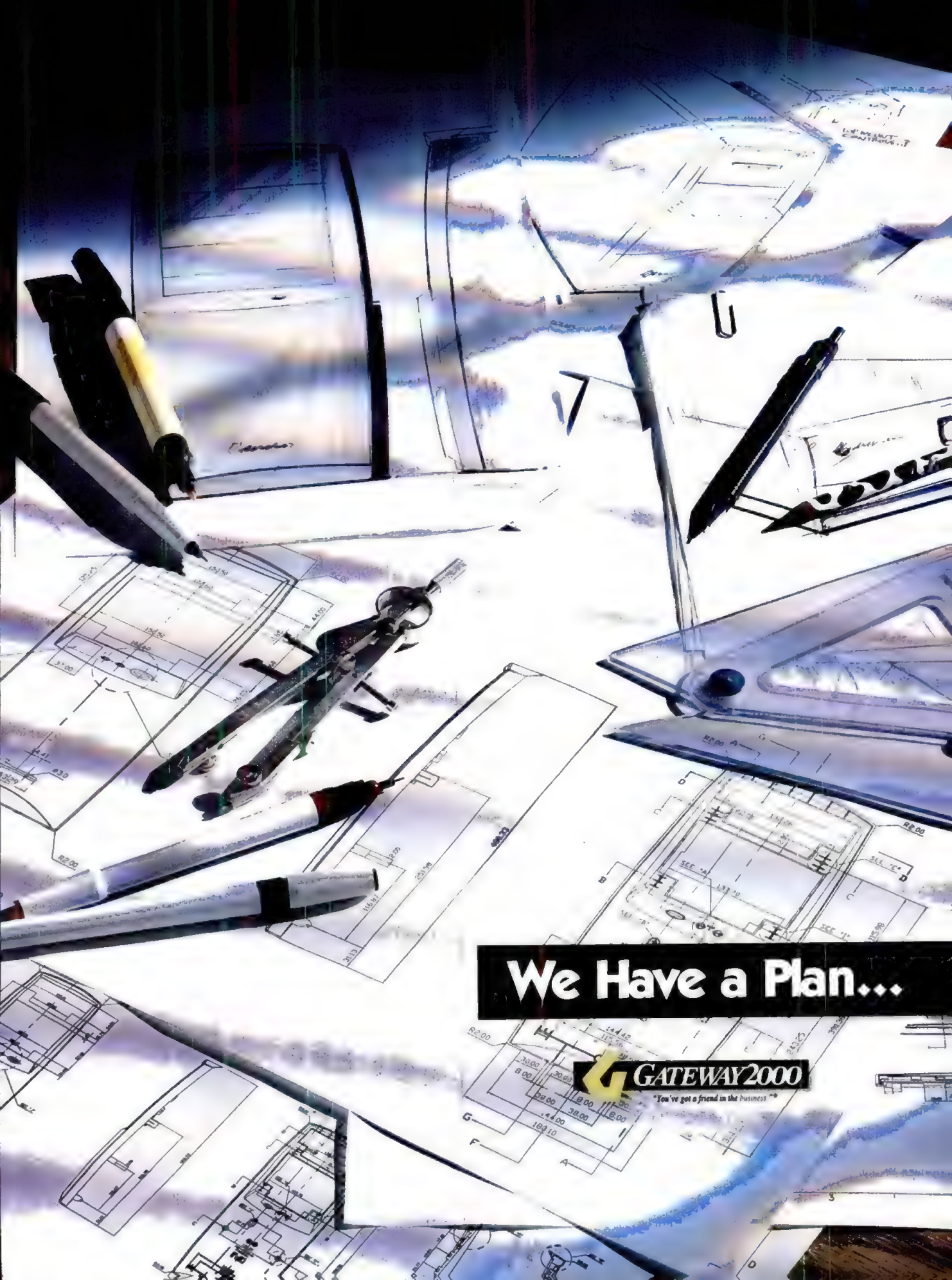
Sharp PC-9300T

Sharp Electronics Corp.'s Sharp PC-9300T (\$3,000 street) is a value-class unit featuring an 11.3-inch TFT display and a Pentium/150 CPU. The PC-9300T has a three-spindle design that saves users the aggravation of carrying a third drive but also means the unit is slightly bulkier. Lackluster performance holds it back. Sharp also makes the intriguing WideNote, intended as a heavy-duty road warrior system, with a 16:9 aspect ratio and an 11.2-inch XGA display.

The all-built-in PC-9300T weighs in at 8.4 pounds (travel

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Samsung SENS Pro 525	Good	Good
Sceptre SoundX 4500	Good	Good
Sharp PC-9300T	Fair	Good

A detailed architectural drawing of a building floor plan is spread across a desk. Various drafting tools are scattered around: a large set square on the right, a compass and divider in the center, and several pens and pencils. The drawing includes dimensions, section lines (e.g., 'SEC. A-A', 'SEC. B-B'), and a grid system (A-G, 1-5).

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weight), complete with an internal 33.6-Kbps modem. The system's SVGA display supports 24-bit color and features Sharp's Super High Aperture technology, which the company claims increases screen brightness while offering longer battery life than standard TFT screens permit. The system's video-out port supports both NTSC and PAL.

Performance was not this unit's strong suit: It earned below-average Winstone, graphics, and disk test scores. Its nickel hydride battery lasted 2:12 on our test.

The unit has a three-year warranty with one year of Sharp's SharpFast service, which guarantees 24-hour turnaround on repairs. Fine as a general-purpose notebook, the PC-9300T benefits from good components and comprehensive service coverage.—BB

Sharp PC-9300T. Street price: \$3,000. Sharp Electronics Corp., Mahwah, NJ; 800-237-4277, 201-529-8200; fax, 201-529-9637; www.sharp-usa.com. Circle 492 on reader service card.

Tatung Co. of America Inc.

Tatung TNB-5500

Tatung Co. of America's value-class Tatung TNB-5500 (\$2,995 direct) is meant to be a multimedia machine and to serve as a desktop replacement for small and medium-size businesses. The Pentium/133-based TNB-5500 did not perform well, but with a 12.1-inch TFT screen and a reasonable price, it provides decent value.

Weighing in for travel at 7.5 pounds, the unit comes with a touch pad and a built-in 28.8-Kbps modem. The unit's floppy disk drive can be swapped for an 8X CD-ROM drive. This system is also one of the few to adopt one of Duracell's standard-size nickel hydride batteries in its design, which is more an indicator of good design strategy

than of any real market or performance value. The battery lasted 2:12 on our test.

On our tests, the system produced mixed results. Its Winstone, Graphics WinMark, and CPUmark₃₂ scores were below average, but the remainder of its

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Tatung TNB-5500	Fair	Good
Toshiba Tecra 740CDT	Good	Good
Transmonde Vibrant 166TMX	Good	Good

scores were average for its class.

The Tatung TNB-5500 is a sturdy system that will get the job done.—BB

Tatung TNB-5500. Direct price: \$2,995. Tatung Co. of America Inc., Long Beach, CA; 800-829-2850, 310-637-2105; fax, 310-637-8484; www.tatung.com. Circle 493 on reader service card.

Toshiba America Information Systems Inc.

Tecra 740CDT

The high-end Tecra 740CDT (\$6,684 list) with a Pentium/166 MMX CPU leaves no doubt that Toshiba continues to push the envelope in notebook technology. The 740CDT has enough features to make even power desktop users envious.

The unit's stunning, 13.3-inch XGA TFT screen has support for Zoomed Video. Toshiba's tiny NoteWorthy videocamera, NoteWorthy 32-bit CardBus Video Conferencing PC Card, and NoteWorthy Business Conferencing software with Intel ProShare Technology (a \$499 bundle if bought separately) make for im-

pressive videoconferencing.

Although big at 9.5 pounds (travel weight), this unit includes an integrated AC adapter (new models sans integrated adapter are available). It also has a built-in 28.8-Kbps voice modem with a phone jack, and its 10X CD-ROM drive swaps for a floppy disk drive; both modules can be used externally.

The system had average scores on all our tests except an above-average score on our CD-ROM WinMark 97 tests. The unit's lithium ion battery lasted an admirable 2:49.

We did not test Toshiba's Satellite value line or its newest Portégé subnotebook (which has a system weight of 3.8 pounds), because both were being refreshed and were not available in time for testing. See First Looks in our July 1997 issue for more on the new Portégé 380

and Toshiba's Libretto, an ultracompact system.—RSA

Tecra 740CDT. List price: \$6,684. Toshiba America Information Systems Inc., Irvine, CA; 800-457-7777, 714-583-3000; fax, 714-461-9027; www.computers.toshiba.com. Circle 494 on reader service card.

Transmonde Technologies Inc.

Vibrant 166TMX

While Transmonde Technologies' Vibrant 166TMX (\$4,199 direct) offers some nice conveniences, this high-end, Pentium/166 MMX unit was a disappointing performer, posting below-average scores on almost all our tests. Transmonde was founded last year and is affiliated with ASC, a Taiwanese computer firm.

The Vibrant 166TMX, which has a travel weight of 8 pounds (external battery not included), features a built-in 33.6-Kbps modem with an RJ-11 jack and a button near the 12.1-inch TFT display that instantly places the unit into suspend mode. The unit has a 4-Mbps IR port, a USB port, and



Transmonde Vibrant 166TMX, Toshiba Tecra 740CDT, Tatung TNB-5500.

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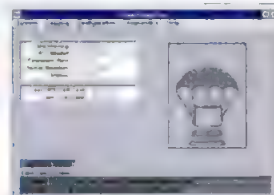
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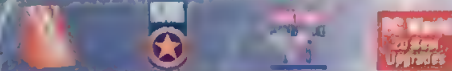
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an NTSC video-out port. The unit's 8X CD-ROM drive can be swapped for a floppy disk drive that you can use externally with the included cable.

A second battery comes standard with the system and clamps onto the bottom, producing a tilted keyboard that many users may prefer. Lithium ion batteries, now standard, were unavailable in time for testing. We received nickel hydride batteries. With the internal battery alone, the system lasted just 52 minutes, which makes the second battery (weighing 1.4 pounds) more of a necessity than a convenience.

The Vibrant 166TMX offers some good features, but poor performance and a short battery life (on our tested unit, at least) may give some buyers pause.—*RSA Vibrant 166TMX*. Direct price: \$4,199. Transmonde Technologies Inc., Cerritos, CA; 888-988-2883, 714-562-0928; fax, 714-



562-8052; www.transmonde.com. *Circle 495 on reader service card.*

Twinhead Corp.

Slimnote-9166TZ

Twinhead Corp. hopes to trim away what you pay for those other brand names and give you more for your money with its high-end Slimnote-9166TZ (\$4,100 street). And you do get a good

deal: a full-featured notebook with a 12.1-inch TFT SVGA display that delivers mostly average performance from its mobile Pentium/166 MMX chip.

The system, which is 8.1 pounds (travel weight), comes with composite video output, a built-in 33.6-Kbps modem, Card-Bus support, and a well-designed keyboard with a good touch pad. Its CD-ROM and floppy disk drives are permanently installed, and its case has a separate cover for the port replicator jack.

The system performed competitively, earning mostly average scores except for a below-average Disk WinMark result and an above-average CD-ROM WinMark score. Its lithium ion battery lasted 2:12. We actually received two Twinhead units: the first with a cooling fan that always stayed on, and the second with a variable fan that Twinhead says is the current configuration.

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Pentium Notebooks

Battery life did improve by 5 minutes with the second unit, but it wasn't stable enough to run our benchmark tests. All printed results are from the first unit.

The system has some good features and will get the job done.—*WLR*
Slimnote-9166TZ. Street price: \$4,100. Twinhead Corp., Fremont, CA; 800-995-8946; 510-492-0828; fax, 510-492-0820; www.twinhead.com. *Circle 496 on reader service card.*

WinBook Corp.

WinBook FX P166MMX, WinBook FX P133

With long battery life, integrated fax modems, and solid performance, WinBook Corp.'s two entries—the classic Pentium/133-based, \$2,499 WinBook FX P133 and the Pentium MMX/166-based \$3,799 WinBook FX P166MMX—are reasonable choices in the value and high-end categories, respectively. The P133 and P166MMX mark the two poles of the vendor's high-end FX

SUITABILITY TO TASK

	Desktop replacement	Road warrior
Twinhead Slimnote-9166TZ	Good	Good
WinBook FX P166MMX	Excellent	Excellent
WinBook FX P133	Good	Good

modular notebook series.

The 8.4-pound P133 comes with an 11.3-inch active-matrix display, a 2.1GB hard disk, a pointing stick, and a Cirrus Logic graphics chip set with 1MB of fast-page-mode DRAM. This unit is similar to AST's Ascentia P80, also reviewed here.

The P166MMX offers a 12.1-inch active-matrix color display, a Chips and Technologies graphics chip set, and a 2.9GB hard disk. The unit, which weighs 8.5 pounds (travel weight), features both a touch pad and a pointing stick, which can be active simultaneously.

Both WinBooks have CD-ROM drives (a 6X on the P133 and a 10X on the P166MMX) that can be swapped for a floppy disk drive or a second battery, and both have integrated fax modems (28.8 Kbps on the P133 and 33.6 Kbps on the P166MMX) with RJ-11 jacks. Each unit also has PC

Card slots that can hold one Type II and one Type III device at the same time.

The lithium ion batteries in both units fared well on our test.

The P133 had a time of 2:52, but the P166MMX kept going, reaching a stunning 3:42.

The P133 had average scores for its class except a below-average CD-ROM score. The P166MMX was a sterling performer, with above-average scores on our Winstone, Graphics WinMark, and CD-ROM WinMark tests (the latter score was the best we saw). Other scores were average.

WinBook also offers a \$139 port replicator and a \$399 universal docking station with the units, as well as the \$259 MiniDock. Excellent battery life, competitive performance, and a good feature set should keep both of these units under serious consideration.—*RSA* □

WinBook FX P166MMX. Direct price: \$3,799.
WinBook FX P133. Direct price: \$2,499.
 WinBook Corp., Columbus, OH; 800-651-4518; fax, 800-448-0308; www.winbook.com. *Circle 497 on reader service card.*

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CONTACT AND INFORMATION MANAGERS

Get It Together

Forget PIMs. Contact managers and information managers aren't just for personal use anymore. These 17 products can help workgroups better manage information.



By Wayne Kawamoto

We live in busy times. And busy times call for serious tools that can keep tabs on contacts, tame hectic schedules, and organize all the data that floods our PCs and our desks on a daily basis. Fortunately, contact managers and information managers can help you get a handle on it all.

Initially, contact and information managers were fairly simple products. Better known as *personal information managers* or PIMs, they leveraged the abilities of a PC to keep track of people and appointments—the electronic equivalent of a day planner. More recently, with the evolution of networked computing, these products have taken on entirely new dimensions. In addition to keeping individual appointments, they can manage schedules for entire workgroups. They can share contacts, remember the relationships between them, and record all



Thinking of switching to one of the products reviewed here? Before you make the leap, make sure your data is prepared to go along by using our new, interactive import/export selector at www.pcmag.com. We transferred test data from five top-selling information managers to all 17 contact and information managers in this story. The results were surprisingly mixed.

communications. They get along well with the other productivity applications filling your hard disk and with the Internet. And they can synchronize data between PCs and even with handheld devices. Of course, this added functionality comes at the price of added complexity. To take full advantage of some products reviewed here, you'll need the right groupware and the expertise to install and administer them.

For this story, we evaluated 17 contact and information managers that range in street price from \$45 to \$300. We reviewed only those packages that received an overhaul since our last roundup ("Good-Bye, Rolodex! So Long, Sticky Notes!", April 23, 1996). This year, for the first time, we've divided these products into distinct categories—contact managers and information managers—and we've selected Editors' Choices in both categories. Because there remains significant overlap between these categories, we evaluated both using the same criteria: contact management

ability, scheduling, task management, information management, workgroup features, and remote synchronization.

In a sign of how far these products have come, this year we decided to look at only those contact and information managers that offer built-in networking and group capabilities. Although not truly a network product, Starfish Software's Sidekick 97 is included here because it offers group scheduling features via an innovative Internet-based system.

The three major office suite vendors—Corel, Lotus, and Microsoft—each offer a bundled information manager. We tested Lotus Organizer 97 GS and Microsoft Outlook 97. Corel's new offering, CorelCentral 8, did not ship in time for this story but should be available with Corel WordPerfect Suite 8 and Corel WordPerfect

Suite 8 Professional by the time you read this or shortly thereafter. CorelCentral will be integrated with Netscape Communicator for e-mail, Web browsing, discussion groups, and conferencing.

To distinguish contact managers from information managers, think of a *contact manager* as an address book on steroids. It not only tracks names, addresses, and phone numbers but also handles countless minute details. It can show you all the contacts associated with a specific company and maintain detailed histories of tasks, meetings, and phone calls for those contacts. When a client calls, your contact manager can quickly bring up a detailed, time-stamped list of every dealing you've had with that client. Because users of contact managers typically spend lots of time on the road, such packages also need robust remote synchronization capabilities.

Information managers (IMs), on the other hand, are designed to help you organize all sorts of information, including the

Your Options for Managing Information

WHAT'S ON YOUR PC The three major office suites, Corel WordPerfect Suite 8, Lotus SmartSuite 97, and Microsoft Office 97, all include their own information managers. Corel Corp. has replaced the multiple options in previous versions with a single, integrated information manager called CorelCentral, which was not available in time for testing. Lotus Organizer 97 GS and Microsoft Outlook 97 are included in this roundup.

MAKING CONTACT Contact managers are for professionals whose work is organized around people. Some of the features that distinguish contact managers from information managers are the

ability to keep detailed histories of activities for each contact, the ability to group contacts easily, and enhanced telephony features.

FOR YOUR INFORMATION Think of information managers as containers in which you can store any type of information you want to preserve—appointments,

notes, and to-do lists, as well as contacts. Information managers can be divided into two categories: free-form packages that you can structure to handle a variety of information and programs that more closely resemble traditional paper-based organizers.

INFO TO GO After years of false starts, hand-held computing devices are finally finding their niche, thanks in large part to the release of two new platforms: U.S. Robotics' PalmPilot and, more recently, Microsoft Windows CE.

The PalmPilot is slightly larger than a deck of cards and includes a scheduler and address book. Windows CE devices are larger but also include keyboards and slimmed-down versions of Microsoft Word and Excel. Both platforms work well with your desktop, allowing you to synchronize data and take it on the road without having to carry a laptop.

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notes you might scribble on a legal pad or sticky note. Information managers also keep track of contacts and appointments, but you can also use them, for example, to record meeting notes, enter your favorite team's schedule, or keep an inventory of your music CDs. And you can later locate information using fast, powerful search features. Some IMs, such as Lotus Organizer 97 GS and Day-Timer Organizer 2.1, are basically computerized paper organizers, while others, such as NetManage's ECCO Pro 4.01 and Micro Logic's Info Select 4.0, offer a more free-form approach.

All these contact and information managers offer some Internet-related features. And more of these products are directly supporting Internet e-mail and, most important, POP3 e-mail. Several packages let you associate live URLs with contacts and companies. A handful of products take the Internet-enabled concept even further, whether synchronizing databases remotely using the Internet or sending e-mail via the Internet for group scheduling.

Other trends we see currently in this product category include enhanced workgroup functionality and integration with Lotus Notes, as well as support for the U.S. Robotics PalmPilot and for Windows CE devices (built-in or through add-ons and third-party utilities). See the sidebar "Between the PC and the Palm of Your Hand" for more on these contact and information alternatives.

With all the choices out there, how can you select a contact or information manager that's right for you? The best way is to appraise your needs and think about the ways in which you prefer to organize information. If your business is built around clients, a contact manager such as Symantec's ACT! 3.0 for Windows 95/NT, GoldMine 3.2, or Maximizer 97*is* should do the trick. But if you prefer a little more flexibility, you can opt for an information manager such as ECCO Pro or Info Select. If you just want to get up and running fast, an easy-to-use information manager like Day-Timer Organizer 2.1 or Sidekick 97 should offer everything you need. With the right contact or information manager, you'll find yourself working more efficiently, forgetting fewer appointments, and spending less time hunting for lost information. Not only will you stay afloat in the information deluge, you may even thrive in it.

SYMANTEC CORP.

ACT! 3.0 for Windows 95/NT

The product that popularized contact managers, Symantec Corp.'s ACT! continues to appeal to a wide range of professionals, especially small-business and SOHO users. New and established users alike will appreciate that ACT! 3.0 for Windows 95/NT (\$200 street) is easy to use, offers an impressive degree of customization, and incorporates workgroup features. It allows users to share calendar information over the Internet, by e-mail, or over a LAN. Only its slow data importing and inability to find free time when scheduling mar its performance.

We found that installing the product on a

network was relatively easy. And during our testing, ACT! was so easy to use that we rarely had to resort to its documentation.

Importing data into ACT! was somewhat slow, especially on a 486. But the process proved successful: The program automatically maps fields it recognizes, and it lets you map the remaining ones to corresponding ACT! fields or exclude them.

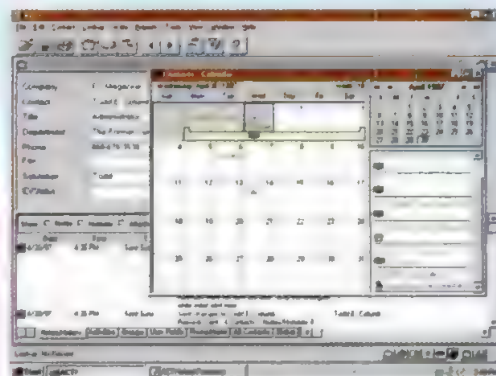
The 70 default fields and the form designs are well thought out and will meet most users' needs. But because ACT! is now fully customizable, you can change fields or a form layout however you like. You can also now define an unlimited number of fields with explicit data types, display formats, and indexing. And the form layout designer lets you place fields anywhere and format them. In addition, you can use



Contact Managers

The core features of contact managers have changed little; these packages continue to excel at keeping track of the people you do business with and maintaining a detailed history of all the activities centered around them. But enhanced workgroup features combined with e-mail and Internet integration are creating whole new possibilities.

DEF



ACT!'s month view displays all appointments, calls to make, to-do items, and related contacts.

SUITABILITY TO TASK: CONTACT MANAGERS



	ACT! 3.0 for Windows 95/NT	ACT! 1.5 for Lotus Notes	GoldMine 3.2 for Windows 95 and NT 4.0 Editors' Choice	Janna Contact Professional	Maximizer 97 is	On-Schedule 97 for Windows 95 and NT	Sharkware 3.0 Anywhere	TeleMagic Enterprise 3.0
POWER								
Contact management	Excellent	Good	Excellent	Good	Excellent	Fair	Good	Good
Calendaring and scheduling	Excellent	Fair	Excellent	Good	Excellent	Good	Good	Good
Task management	Good	Good	Good	Fair	Good	Fair	Good	Good
Information management	Fair	Poor	Good	Good	Good	N/A	Fair	Good
Workgroup	Good	Excellent	Excellent	Good	Fair	Fair	Fair	Good
Remote	Good	Good	Excellent	N/A	Fair	N/A	Good	Good

EASE OF USE

Contact management	Excellent	Good	Fair	Excellent	Good	Good	Excellent	Good
Calendaring and scheduling	Excellent	Fair	Good	Excellent	Good	Good	Excellent	Good
Task management	Good	Good	Fair	Good	Good	Good	Good	Fair
Information management	Good	Good	Good	Good	Good	N/A	Fair	Good
Workgroup	Excellent	Good	Good	Good	Good	Excellent	Good	Fair
Remote	Fair	Excellent	Fair	N/A	Good	N/A	Good	Good

N/A—Not applicable. The product does not have this feature.

Contact management features include the ability to track all necessary information about individuals with whom the user interacts. This task involves the tools for adding and importing contacts, the design and customizability of contact records, and the ability to record interaction with a contact, such as phone calls and meeting notes, in a history log. In the **calendar and scheduling** category, we look at the capabilities of the program in adding, modifying, and deleting individual and recurring appointments, setting alarms, and printing calendars. We also look at how well the program can share calendar information with colleagues and its ability to make links between the calendar and contacts. **Task management** involves the ability to prioritize and maintain tasks such as to-do items and phone calls. It also considers the management of related tasks, meetings, and contacts,

and the ability to link these to other areas of the program such as the calendar and contact databases.

Information management includes tools such as outliners for data entry and organization, and the ability to customize databases with specific fields that correspond to the user's method of organizing data.

The **workgroup** task features such as the ability to share information selectively, the integration with e-mail, and group scheduling tools.

The **remote** task includes the ability to transfer all or parts of the database to a laptop computer and synchronize the data once it has changed. We also consider the program's ability to link with hand-held devices.

ACT!'s built-in word processor, or Corel WordPerfect, or Microsoft Word.

Finding a contact's name using one of the several standard indexed fields is simple and swift. More complex searches are also easy but take more time if the information is in a nonindexed field (history, activities, notes, and so on). You can perform Boolean searches, though you must go through three levels to do so.

From a single dialog box, you can set up meetings, create to-do lists, and schedule phone calls for yourself, your contacts,

or a group. The same dialog box also allows you to schedule recurring activities, set an alarm, change the display color, and establish priority levels. You can view and print your schedule using the refreshed day, week, or month views. In addition, you can customize calendars to include or exclude activities based on user-defined groups, priorities, and types. Unfortunately, ACT! can't find free time if you run into a scheduling conflict among users.

To let remote users and those on the LAN share contacts, ACT! uses several

synchronization methods. On the corporate LAN, ACT! can synchronize directly between databases. It also lets you update data via cc:Mail, Lotus Notes, Microsoft Exchange, or MS-Mail. Or you can dial in using ACT!'s remote modem synchronization. During synchronization, administrators can control changes to the database at the field level, and several users can update different fields in the same contact record simultaneously; the latest change (based on date and time) prevails.

A longtime player in this category, ACT! continues to deliver a crowd-pleasing performance.—*Todd Columb*

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ACT! 3.0 for Windows 95/NT. Street price: \$200. Requires: 486-based PC or better, 8MB RAM, 23MB hard disk space, Microsoft Windows 95 or Windows NT 3.51 or later. Symantec Corp., Cupertino, CA; 800-441-7234, 408-253-9600; fax, 408-973-9340; www.symantec.com. *Circle 450 on reader service card.*

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SYMANTEC CORP.

ACT! 1.5 for Lotus Notes

When it was released last year, ACT! for Lotus Notes was clumsy, slow, and limited in functionality. Symantec has made a big stride forward with its latest version, ACT! 1.5 for Lotus Notes (\$250 street). It's faster and smoother, though—like most Notes applications—not quite as polished as a standalone Windows program.

ACT! for Notes requires the Notes 4.5 client. If the user is connected to a Domino 4.5 server, the program will integrate with Domino's group scheduling capabilities. Installing ACT! for Notes is relatively easy, but the sparse documentation isn't very helpful.

Like Maximizer, the program uses separate company and contact records, but without implementing that method very well: Certain views use the company information stored in the contact record, while others use the company list. And although you can link contacts to companies, you have to do so manually.

Aside from this divided approach, ACT! for Notes adheres to the record structure of its Windows sibling. It stores history and notes as separate records, links them (automatically) to each contact, and allows you to view them quickly in the contacts list. But it doesn't let you quickly jump from, say, a history entry to the contact record. And deleting a contact doesn't automatically delete its history.

The documentation recommends creating a full-text index for each database,

and we found this made searching very fast, even on large data sets. To find any record, just click on the column heading you want and start typing. Or if you type any string on the search bar, the matching records will quickly appear.

Notes 4.5 added group scheduling by placing a calendar in each user's mail file. ACT! also has a calendar, with which you can schedule events and create to-do lists for the database's contacts and companies. Unfortunately, ACT! doesn't automati-

cally add items from its calendar to your mail calendar. Maintaining separate calendars lets Notes 4.5 clients use ACT! with servers for earlier Notes versions but will likely cause confusion and scheduling conflicts among users.

ACT! for Notes can link to Word, WordPerfect, or Word Pro, and it stores the resulting documents as OLE-embed-

Editors' Choice: Contact Managers

• GoldMine 3.2 for Windows 95 and NT 4.0



The adage rings true for contact managers: The more things change, the more they stay the same. GoldMine, our Editors' Choice for the third year in a row,

can do just about anything you could ask for once you're accustomed to its sometimes cryptic conventions. (Our Editors' Choice selections in the information manager category appear later in this story.)

The core of GoldMine 3.2 for Windows 95 and NT 4.0 is a contact record consisting of a form displaying basic information (address, phone number, and so on) and a series of tabbed dialogs for more details. Beneath this basic exterior, GoldMine's many features include a variety of ways to view information, a revamped calendar, and built-in e-mail, as well as tight integration with the Internet. GoldMine automatically logs incoming

and outgoing mail in its history. You can even pull data from a Web page, enter it in a new contact record, and then a launch a task sequence for pursuing that prospective client.

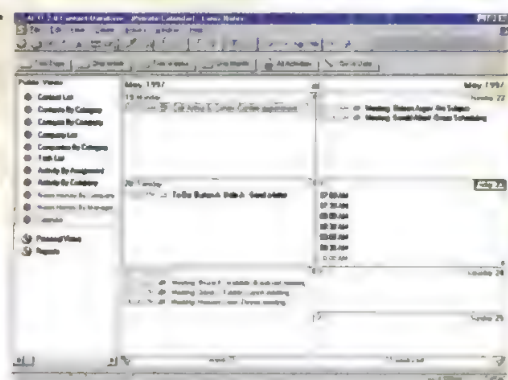
Two other products in this category deserve an honorable mention: Symantec Corp.'s ACT! 3.0 for Windows 95/NT and Maximizer Technologies' Maximizer 97is. From a single dialog box in ACT! you can easily set up meetings, create to-do items, or schedule phone calls. Maximizer, a list-based contact manager, is especially adept at handling multiple contacts grouped under a single company. Feature for feature, neither of these can match GoldMine, but they offer just about everything most users will need.

ded files. But reporting falls short: You cannot preview reports or print them for selected date ranges.

Security in ACT! for Notes is quite good. And because of the integration with Notes, you can link to URLs, although the program's Internet functionality pretty much ends there. Oddly, the program doesn't take advantage of Notes' field-level replication by default, but a knowledgeable Notes developer can enable it. Symantec also plans to ship ACT! for Domino later this year. It will allow access to the same data as ACT! for Notes via a Web browser.

Ultimately, ACT! for Notes is not as robust as other programs in this roundup. But organizations that want to leverage their Notes infrastructures and need only basic contact management may want to give it a try.—Ben Z. Gottesman

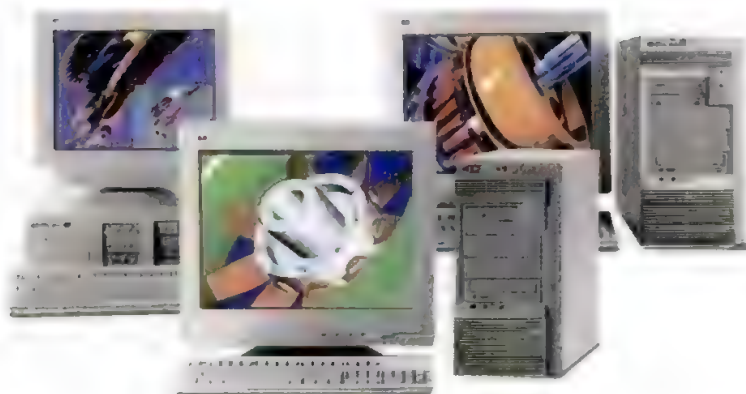
ACT! 1.5 for Lotus Notes. Street price: \$250. Requires: Pentium-based PC or better, 16MB RAM, 6MB hard disk space, Microsoft Windows 3.1 or later or Windows NT 3.51 or later, Lotus Notes 4.5. Symantec Corp., Cupertino, CA; 800-441-7234, 408-253-9600; fax, 408-973-9340; www.symantec.com. Circle 450 on reader service card.



ACT! for Lotus Notes uses a calendar separate from that of the Notes 4.5 client.

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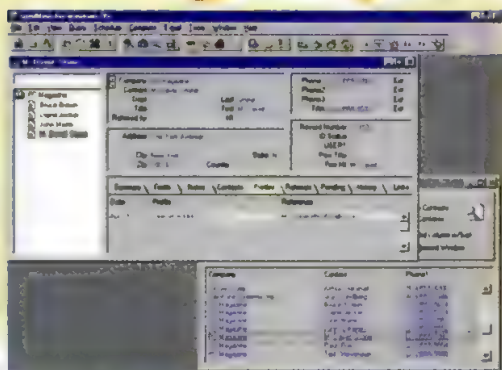
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Contact Managers



The core of GoldMine is the contact record, which has tabbed boxes for displaying details.

GOLDMINE 3.2 SOFTWARE CORP.

GoldMine for Windows 95 and NT 4.0



For the past two years, GoldMine has earned our Editors' Choice award, so it's no surprise that the product continues to offer an impressive set of features. But GoldMine Software Corp. hasn't rested on its laurels: It has worked hard to add still more to this formidable package. GoldMine 3.2 for Windows 95 and NT 4.0 (\$180 street) has better Internet integration and a completely revamped calendar view.

GoldMine's basic view remains the individual-contact record, which takes up most of the workspace. Each dialog box's upper portion displays core information for an individual, such as name, address, and phone number. The bottom half consists of a series of tabbed cards (similar to the designs of ACT! and Maximizer) with additional information about the contact—notes, user-defined fields, history items, pending tasks and appointments, and more. This format lets you easily see all the information you need.

One of the most innovative features is a graphical tree of related contacts—basically an organization chart. Its obvious function is to link all contacts in the same company, but you can add any other relevant individuals, such as PR contacts or attor-

neys. Even better, you can switch to the record for any linked contact simply by highlighting the name. This chart acts as a more in-depth referrals tab; note that you can still use the latter in GoldMine but you can't link it to the organization chart.

The new graphical calendar is also noteworthy. It lets you view more than one activity entry in a time slot and see entries for events that span multiple days. Also, it displays to-do items in a separate area in the daily view, and it shows shorthand details of scheduled events in the month view.

One of GoldMine's advantages is that it offers many ways to view data. This version adds a planner view, outline view, and pegboard. The planner is useful for group scheduling: You choose which users to include, and it represents them with colored blocks so you can see availability at a glance. The outline view lets you see appointments in a collapsible outline format.

No other contact manager has such a variety of functions: synchronization at the field level by several routes (including the Internet), performance analysis, creation of branching telephone scripts, and more. And as you'd expect, GoldMine offers the full set of basics—searching for contacts, phone dialing, call logging, and so on.

E-mail and Internet integration are also among its strengths. The program has a built-in e-mail client for communicating with other GoldMine users on your network, and it automatically logs incoming (POP3) and outgoing (SMTP)

mail to the relevant contact's history log. You can also send mail using MAPI or VIM, although GoldMine doesn't log these messages. This release lets you launch to URLs and accept data from Web pages, use it to create new contact entries automatically, and tie the pages to custom-automated task sequences.

GoldMine's one shortcoming is a less-than-intuitive interface, which often hides more sophisticated features. But if you're willing to spend time learning it, you'll find that GoldMine is one of the most capable contact managers available.—M. David Stone

GoldMine 3.2 for Windows 95 and NT 4.0.

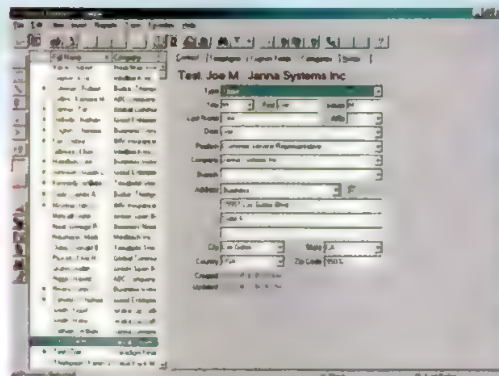
Street price: \$180. Requires: 386-based PC or better, 4MB RAM, 8MB hard disk space, Microsoft Windows 95 or Windows NT 4.0. GoldMine Software Corp., Pacific Palisades, CA; 800-654-3526, 310-454-6800; fax, 310-454-4848; www.goldminesw.com. Circle 451 on reader service card.

JANNA SYSTEMS

Janna Contact Professional

With a much-needed performance boost and enhanced ease of use, the newest version of Janna Contact Professional (\$200 street) emerges as a more reliable contact manager. It's most suitable for smaller businesses, though, as it lacks the power of top-notch products such as ACT!, GoldMine, and Maximizer.

Janna Contact's contact management features cover most of the basics. You can have an unlimited number of fields and customize them as you wish. Entering



Janna Contact Professional lets you switch between list and form views quickly.



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SOFTWARE

Contact Managers

contacts is simple, and an automated wizard helps speed the process. A feature called Selection Criteria lets you conduct searches (including Boolean searches) on any combination of fields, and you can save them for easy retrieval.

The product lacks some key features, though. For example, unlike Maximizer, it doesn't allow you to link contacts directly. And it doesn't have any built-in remote synchronization.

Instead, Janna Contact's trump card is its well-designed, easy-to-use, and customizable interface with tabbed layout and adjustable frames. One feature, Favorites, lets you store and retrieve frequently needed contacts without searching. You can also place shortcuts to favorite contacts on your Windows 95 desktop.

The scheduling features (with daily, weekly, monthly, and yearly views) are similarly easy to use. Task management via the calendar is also a no-brainer, and you can assign tasks to multiple users. In addition, a clever document management tool lets the contact manager's Notes section act as an OLE container, so that it can natively store any OLE 2.0 object, such as a voice note for a colleague. And Janna Contact easily integrates with almost any word processing or spreadsheet software, though Microsoft Office is the default.

Fortunately, the performance problems that plagued the last release are no longer an issue. The new version is based on Microsoft's improved database engine, Jet, which uses a Microsoft Access database.

Network configuration takes a matter of minutes, and setting up individual users, groups, and security is straightforward—in sharp contrast to our experience with products such as Commence and Sharkware. Scheduling for multiple users or contacts was no more difficult than for a single person, and it's easy enough to view the schedules for multiple users simultaneously. But Janna Contact doesn't provide any warnings of schedule conflicts. Also missing are features that handle automated tasks (such as follow-ups) and project planning.

Integration with MAPI-compliant e-mail, phone, and fax is relatively simple. But for remote synchronization you need a separate client, Janna Remote (\$150 street). If Janna wants to compete with GoldMine and Maximizer, it needs to build

in remote synchronization.

A built-in Web browser, Web Viewer, handles Internet integration well. You can store any number of URLs as links for contacts, and system administrators can let users view only sites associated with contacts.

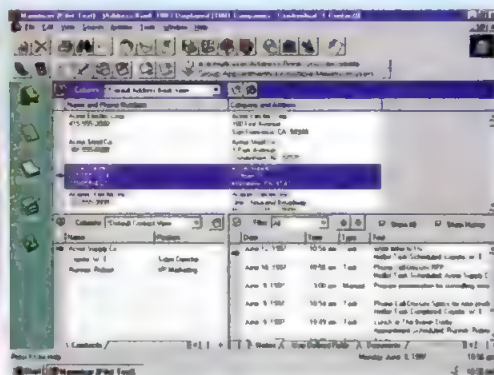
Janna Contact Professional combines decent contact and document management with an attractive interface. But because it omits some potentially critical contact management features, it is not a contender for top honors.—Heath H. Herel
Janna Contact Professional. Street price: \$200. Requires: 486-based PC or better, 12MB RAM, 8MB hard disk space, Microsoft Windows 95 or Windows NT 3.51 or later. Janna Systems Inc., Toronto, Ontario, Canada; 800-268-6107, 416-483-7711; fax, 416-483-3220; www.janna.com. *Circle 452 on reader service card.*

MAXIMIZER TECHNOLOGIES INC. Maximizer 97is

Contact managers fall into two categories: those with forms-based views, such as GoldMine, and those with list-based formats. Maximizer, from Maximizer Technologies, has long been one of the more capable choices for those who prefer to organize information in lists. The newest incarnation—Maximizer 97is (\$140 street)—combines the best of both modes by offering an enhanced list view (the default) as well as a forms-based view.

Maximizer has always done well at managing multiple contacts from a single company. The new version performs this thorny task even better, thanks in part to its default screen setup: an address-book list at the top and two adjustable panes at the bottom. Select a company name in the address book and you'll see a list of its contacts in a bottom pane. Select a contact in a bottom pane instead and you'll see a list of the other contacts from the company in

the top pane. Also, if you highlight the name of any contact in one bottom pane, you can see the complete history for the contact or company in the second bottom pane. You can revert to a list-based view



Maximizer's new default view offers the advantages of both list- and forms-based dialogs.

with a menu choice.

Maximizer remains strong on the basics: finding records, dialing the phone, scheduling tasks, scheduling single and recurring meetings, and logging details. It has a built-in word processor, but you can also use it with all major word processing programs.

One other noteworthy basic is the import utility, Maxport. It not only lets you map your data to the right fields but also recognizes multiple contacts from a company and groups them in one pass.

Unlike GoldMine, Maximizer doesn't have a built-in e-mail client, but it can tie into any 32-bit MAPI or 32-bit VIM e-mail system (and can also tie into its older, 16-bit version). A new trick is the ability to attach an incoming message to a contact record automatically. And much like GoldMine, if Maximizer can't find the sender in its database, it lets you easily create a contact record and then attach the message.

Maximizer does have some shortcomings. For example, you can't create permanent groups when scheduling; instead, you must create ad hoc groups for each meeting. This approach is satisfactory for companies with a few users, but it can be a chore if you have, say, 50 users or more. And the program doesn't do some things at all, including finding free time in your schedule (though it alerts you of conflicts) and performing automated task se-



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quences, project management, telephone scripts, and performance analysis.

Also, unlike competitors such as ACT! and GoldMine, Maximizer relies on extra-cost modules for some features. For bi-directional synchronization, you'll need MaxExchange (\$400 for one server and three remote users). Other modules include a client/server package, an ODBC developers' kit, and data-transfer utilities for Pilot or Windows CE (see the sidebar "Between the PC and the Palm of Your Hand").

If you don't need these features, you'll appreciate that Maximizer does well as far as the functions it does have. And the extra-cost options let you extend it without having to pay for capabilities you don't need just to get started. There's a lot to like in Maximizer. —MDS

Maximizer 97is. Street price: \$140. Requires: 386-based PC or better, 8MB RAM, 15MB hard disk space, Microsoft Windows 95 or Windows NT 4.0. Maximizer Technologies Inc., Vancouver, BC, Canada; 800-804-6299, 604-601-8088; fax, 604-601-8188; www.maximizer.com. *Circle 453 on reader service card.*

ODYSSEY COMPUTING INC.

On-Schedule 97 for Windows 95 and NT

Odyssey Computing bills On-Schedule 97 for Windows 95 and NT as a contact manager with powerful information management features. A more apt depiction of On-Schedule (\$90 street) would be that of a lean contact manager whose designers haven't tried to make it an all-encompassing product like GoldMine or Maximizer but, rather, have concentrated on streamlining the basics of contact management and individual scheduling.

As with Maximizer, On-Schedule's contact management is based on a list view, one that looks like a spreadsheet. You can easily sort any field by clicking on the top of the column, and you can almost as easily add or delete columns from the view. Pressing Ctrl-H brings up a history window that shows all contact you have had or are scheduled to have with the relevant individual. In addition, like robust contact managers such as ACT! and GoldMine, On-Schedule lets you easily link contacts in any way you like, whether they belong to the same organization or not. And linked contacts show up as items in the history.

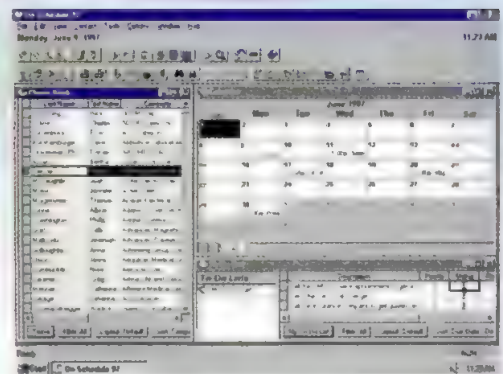
On-Schedule provides you with the usual range of basic contact management capabilities, including phone dialing, task and meeting scheduling, automatic logging of events in the history, and printing reports. The product links to all of the major word processors and also comes with its own, which is a slightly modified version of WordPad.

On-Schedule's search feature is a mixed bag. It enables you to search on any field, and you can build filters for more complex searches using multiple fields and Boolean operators. But you can't use a filter on an indexed field, so you have to delete the index first. According to Odyssey, the program's underlying Borland Database Engine is to blame for this limitation. Borland should have a fix by the time you read this, and Odyssey promises to provide a free update.

On-Schedule addresses all the scheduling basics; it has with daily, weekly, monthly, and yearly views. But be aware that it doesn't support group scheduling. Also, as with ACT! or Janna Contact, you can't have it automatically find free time in your schedule to resolve conflicts, although it does show any conflicts in a highlighted color. You can click on an item in the schedule to see a list of any conflicting events, then drag one to another time or day.

Notably absent in On-Schedule are the ability to move just part of a database to your notebook and a way to synchronize data on two machines. Oddly, both of these features are available in Pocket On-Schedule, a companion product for Windows CE. Odyssey says an extra-cost notebook synchronization module will be available in summer 1997. Three advanced features already in the current version are links to MAPI-based e-mail, mail-merge using e-mail, and the ability to launch your browser and go to a Web page from a URL field.

ACT!
E
F



On-Schedule can cram a lot onto a single screen. Shown here are the phone book, calendar, and to-do list.

Aside from its problems with applying filters to indexed fields, On-Schedule is a reasonable choice if you're looking for basic contact management and scheduling without more sophisticated features you may never need. —MDS

On-Schedule 97 for Windows 95 and NT. Street price: \$90. Requires: 386-based PC or later, 8MB RAM for Windows 95 or 12MB RAM for Windows NT, 10MB hard disk space, Microsoft Windows 95 or Windows NT 4.0. Odyssey Computing Inc., San Diego; 800-965-7224, 619-675-3660; fax, 619-675-1130; www.odysseyinc.com. *Circle 454 on reader service card.*

COGNITECH CORP.

Sharkware 3.0 Anywhere

An elegant and straightforward interface, the powerful Sybase SQL database engine, and the inclusion of savvy sales tips make CogniTech Corp.'s Sharkware 3.0 Anywhere a sound choice for medium and large sales forces. But unlike contact managers such as ACT! and GoldMine, it doesn't have many features such as task management and advanced group scheduling.

At a direct price of \$300 per user (\$500 per remote user), this client/server program is also one of the more expensive packages in its category. CogniTech additionally offers a standalone version, Sharkware 3.0 Professional (\$199.95 list)—without remote synchronization and with limited group scheduling—as well as Sharkware 3.0 Network (street



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HP Vectra V and X Series PCs include all the hardware and firmware modifications necessary to implement HP NightDIRECTOR, 1997 EPA ENERGY STAR® award winner.

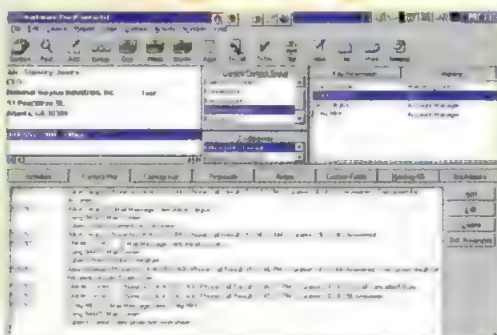
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Sharkware lets you scan an entire company history when you view a single contact.

price \$300 per user), which adds workgroup features.

Sharkware excels at brute contact management—namely, grouping and searching for contacts. As with ACT! and GoldMine, you can easily define contact groups and seamlessly switch between them. In addition, you can create a custom set of fields and associate them with a contact group. The program automatically places together contacts from the same company in the Company View tab.

Sharkware tracks three different histories. You can not only view a contact's complete history but also bring up a combined view showing the histories for all the contacts for a company. And for linking unrelated contacts, you can use a special, handy field type called "contact" that lets you jump directly to the linked record.

Sharkware's activity calendar is excellent for scheduling single or recurring appointments, items on your to-do list, and phone calls. As a group scheduler, though, the program is limited and cannot plan activities for multiple users or display combined user schedules.

Sharkware can dial the phone for you, track the call's duration, and let you pick from a standard set of follow-ups or customize one. It also integrates with any MAPI- or VIM-compliant e-mail system, as well as with Global Village Communication's FaxWorks and Symantec Corp.'s Delrina WinFax PRO. The program's Internet features include a tab that lets you create bookmarks for URLs.

Distributed sales forces will applaud

for the uninitiated. Since the program works in a client/server configuration, ensuring that clients can communicate with the database server requires several steps. Once you have installed and configured Sharkware properly, the networking features work smoothly.

With Sharkware's approachability and its excellent feature set, it is ideal for medium-size to large sales forces looking to deploy a client/server-based contact management solution rapidly. But feature for feature, it can't match the likes of GoldMine and Maximizer for group scheduling and information management.—Greg Alwang

Sharkware 3.0 Anywhere. Direct price: \$300 per user (\$500 per remote user). Requires: 486-based PC or better; 8MB RAM; 20MB hard disk space (client) and 30MB hard disk space (server); Microsoft Windows 3.x or later or Windows NT 3.51

or later (client); Microsoft Windows for Workgroups, Windows 95, Windows NT 3.51 or later, or NetWare 3.1x or later (server). CogniTech Corp., Atlanta, GA; 800-947-5075, 770-518-4577; fax, 770-518-4588; www.sharkware.com. **Circle 455 on reader service card.**

TELEMAGIC INC.

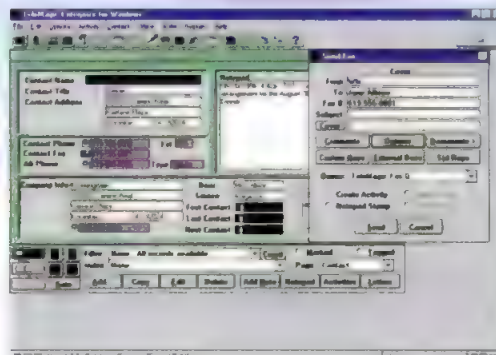
TeleMagic Enterprise 3.0

With the release of TeleMagic Enterprise 3.0, TeleMagic has hit the comeback trail in a big way. The company has included several valuable new features in this version, together with the impressive list of features of the original DOS version. Although this program (with list prices of \$299 for one user and \$1,300 for a five-user license) is impressive out of the box, it is sold through a network of certified value-added resellers (VARs) that know how to leverage its customizability.

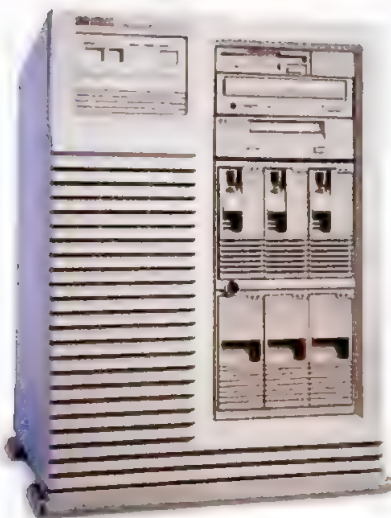
The data structure's three-tier organization—a company view and the company's contacts and their fields—is an approach usually found only in high-end packages, such as Brock and Saratoga. But unlike these elaborate systems for office automation, TeleMagic is priced to compete with contact managers such as ACT! and GoldMine. Its customization costs may still prove pricey for small businesses, which may be better off with a ready-made, feature-rich product such as GoldMine or Maximizer.

In our testing, we easily installed TeleMagic for a single user; the network setup, on the other hand, required much more finesse. But once configured, the program worked fine.

To add a contact in TeleMagic, you work with its three-tier structure, which resembles a hierarchical organizational chart. You start at the company view and can go from there to a company's contacts and their fields.



TeleMagic's contact screen is well organized. Shown on the right are the pop-up fax control windows.



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SUMMARY OF FEATURES

Contact and Information Managers

Contact managers in black type

Information managers in blue type

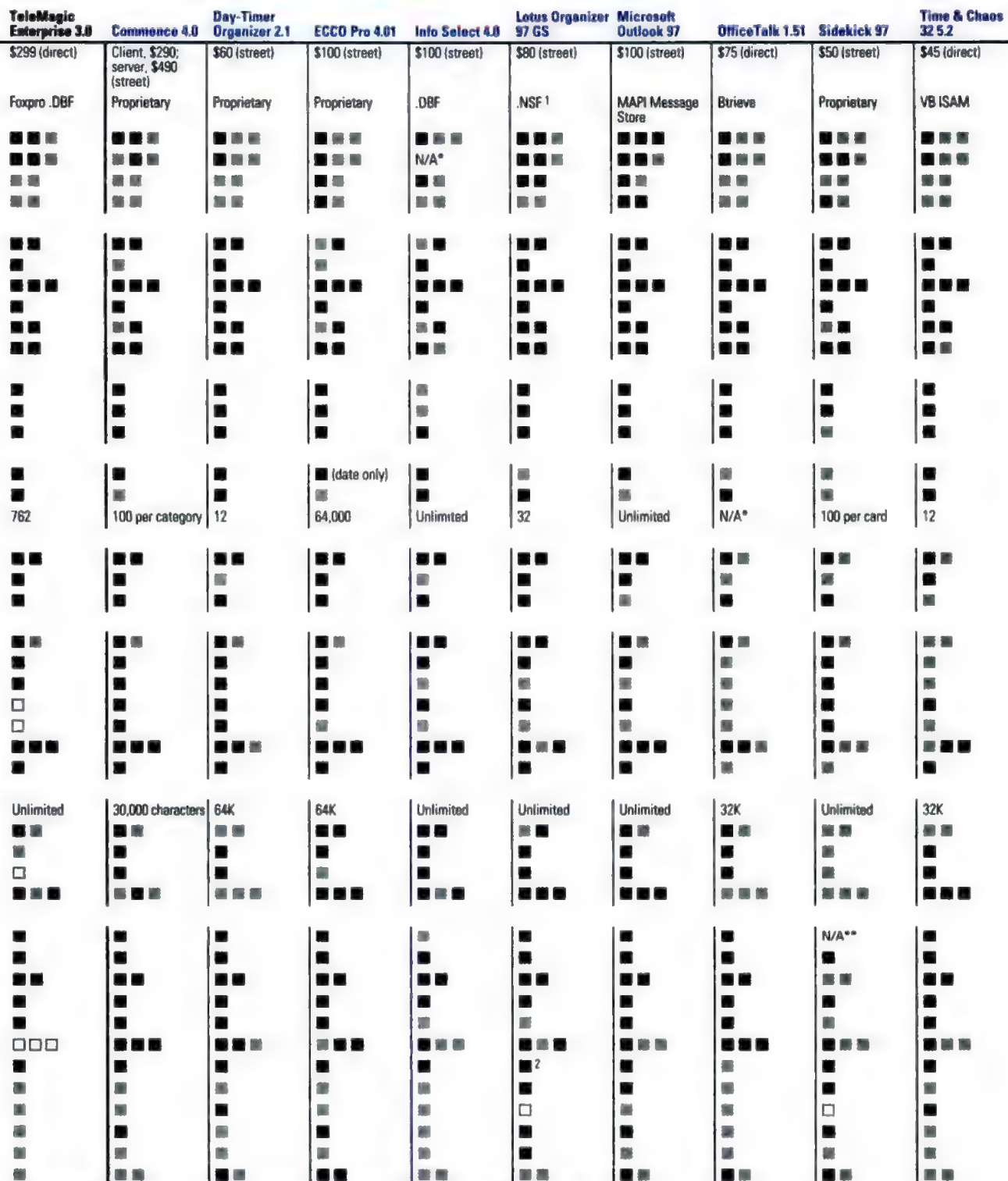
YES ☒ NO ☐ OPTIONAL ☐

Products listed in review order

	ACT! 3.0 for Windows 95 and NT	ACT! 1.5 for Lotus Notes	Goldmine 3.2 for Windows 95 and NT 4.0	Janna Contact Professional	Maximizer 97/98	On-Schedule 97 for Windows 95 and NT	Sharkware 3.0 Anywhere
Price	\$200 (street)	\$250 (street)	\$180 (street)	\$200 (street)	\$140 (street)	\$90 (street)	\$300 per user, \$500 per remote user (direct)
Default database-file formats	.DBF	Lotus Notes .NSF	.DBF	Access (.MDB)	Btrieve	Paradox 7	Sybase
Imports ASCII, dBASE, ACT!	☒	☒	☒	☒	☒	☒	☒
Exports ASCII, dBASE, ACT!	☒	☒	☒	☒	☒	☒	☒
Supports OLE 2.0 as container/as server	☒	☒	☒	☒	☒	☒	☒
Supports Pilot/Windows CE devices	☒	☒	☒	☒	☒	☒	☒
Calendar/Scheduling							
Adjustable workday/workweek	☒	☒	☒	☒	☒	☒	☒
Adjustable scheduled time increments	☒	☒	☒	☒	☒	☒	☒
Daily/weekly/monthly views	☒	☒	☒	☒	☒	☒	☒
Schedules recurring appointments:	☒	☒	☒	☒	☒	☒	☒
Finds/graphically displays free time	☒	☒	☒	☒	☒	☒	☒
Conflict alert/resolution	☒	☒	☒	☒	☒	☒	☒
Tasks/To-Do Lists							
Assigns priority levels to tasks	☒	☒	☒	☒	☒	☒	☒
Carries unfinished tasks forward	☒	☒	☒	☒	☒	☒	☒
Keeps history of tasks after completion	☒	☒	☒	☒	☒	☒	☒
Address Book							
Time- and date-stamps new contact entries	☒	☒	☒	☒	☒	☒	☒
Can detect duplicate entries within database	☒	☒	☒	☒	☒	☒	☒
Maximum number of user-definable fields	Unlimited	44	Unlimited	Unlimited	Unlimited	31	Unlimited
Searches							
Multiple fields/Boolean searches	☒	☒	☒	☒	☒	☒	☒
User can save queries	☒	☒	☒	☒	☒	☒	☒
Indexes all fields and allows global searching	☒	☒	☒	☒	☒	☒	☒
Call Automation/History							
Phone dialer/Automatic redial	☒	☒	☒	☒	☒	☒	☒
Logs call durations	☒	☒	☒	☒	☒	☒	☒
Produces reports of time spent with clients	☒	☒	☒	☒	☒	☒	☒
Supports Windows 95 TAPI for phone dialing	☒	☒	☒	☒	☒	☒	☒
Automatically looks up contacts using Caller ID	☒	☒	☒	☒	☒	☒	☒
Time- and date-stamps by contact: phone calls/meetings/tasks	☒	☒	☒	☒	☒	☒	☒
User can purge historical records by date range	☒	☒	☒	☒	☒	☒	☒
Free-Form Information							
Maximum size of memos or notes	Unlimited	Unlimited	64K	Unlimited	9K	32,000 characters	Unlimited
User can organize information in folders/in outlines	☒	☒	☒	☒	☒	☒	☒
User can create item links or associations	☒	☒	☒	☒	☒	☒	☒
User can link to external files	☒	☒	☒	☒	☒	☒	☒
Notes can contain rich text/graphics/OLE objects	☒	☒	☒	☒	☒	☒	☒
Network/Internet							
Can create private entries	☒	☒	☒	☒	☒	☒	☒
Group scheduling	☒	☒	☒	☒	☒	☒	☒
Can show schedule details/isolate free time	☒	☒	☒	☒	☒	☒	☒
Automatically sends meeting requests	☒	☒	☒	☒	☒	☒	☒
User can assign tasks to others	☒	☒	☒	☒	☒	☒	☒
Mail supports MAPI/VIM16/VIM32 natively	☒	☒	☒	☒	☒	☒	☒
Bidirectional synchronization	☒	☒	☒	☒	☒	☒	☒
Can schedule appointments over the Internet	☒	☒	☒	☒	☒	☒	☒
Can publish calendar on the Web	☒	☒	☒	☒	☒	☒	☒
Preserves embedded URLs as hyperlinks	☒	☒	☒	☒	☒	☒	☒
Accepts data via the Web	☒	☒	☒	☒	☒	☒	☒
Supports POP3, IMAP4	☒	☒	☒	☒	☒	☒	☒

N/A*—Not applicable: The product does not have this feature. N/A**—Not applicable: Sidekick does not support group entries.

Contact and Information Managers

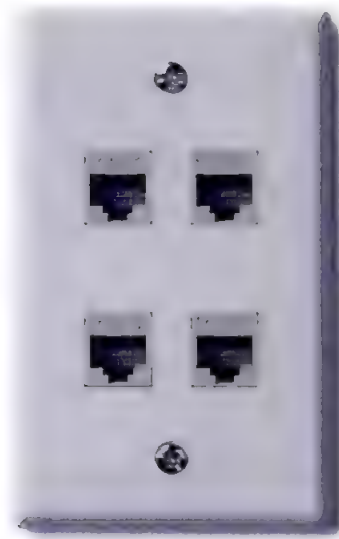


AUGUST 1997 PC MAGAZINE 215

Out of the box *onto the* Network

3COM NETWORK READY PCs - SKIP THE





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You can link schedules to the relevant contacts, and TeleMagic automatically alerts you to conflicts—without automatically resolving them, although it can be designed to do so. The program provides daily, weekly, and monthly views (but not yearly ones), and it provides a history log of entries.

TeleMagic's Branch Scripting is a very useful, automated tool for telemarketing or sales survey calls. And the new fax module includes a feature called Print Capture, which captures the output from any application and attaches it to faxes. In addition, you can use any word processor with TeleMagic to create cover-page templates.

The company offers DataSync Server (\$40 list price per remote user) for synchronizing data between the main database and all remote users. Data packets contain changes at the field level, and DataSync Server not only replicates changes but also lets administrators customize the interface on the corporate LAN and update it for remote users when they synchronize their data. Also, you can use TM Internet (\$75 list) to add Internet functions, such as URL linking, to TeleMagic.

The new version's 16-bit FoxPro code makes TeleMagic's capabilities pale in comparison with the fully implemented Windows interfaces and swift searches of programs such as ACT! and Janna Contact. A 32-bit version written in Visual FoxPro 5 is scheduled for release early next year.

Standalone users and small organizations should opt for one of the robust, ready-made solutions we've reviewed here, such as ACT!, GoldMine, or Maximizer. But if you have a larger sales force or need to manage many departments, you may want to consider TeleMagic for its customization capabilities.—*Lee Steel*

TeleMagic Enterprise 3.0. List price: \$299 per user (\$1,300 for the first group of five users, \$1,000 for each additional five-user license). Requires: 486-based PC or better, 12MB RAM, 50MB hard disk space, Microsoft Windows 3.1 or later or Windows NT 3.51 or later. TeleMagic Inc., Dallas; 800-835-6244, 972-733-4292; fax, 972-733-4251; www.telemagic.com. Circle 456 on reader service card.



Information Managers

Information managers vary widely in terms of features and ease of use. At one end of the spectrum are flexible solutions such as ECCO Pro and Info Select (as well as the groupware-like Commence) that tend to be more difficult to use but more powerful. At the opposite end are products that mimic paper-based organizers and

typically are easier to use. Products that fall into this category include Day-Timer Organizer and Lotus Organizer 97 GS. All the products in this category include some networking features such as group scheduling. Regardless of what type of information you need to manage, one of these packages should meet your needs.

SUITABILITY TO TASK: INFORMATION MANAGERS



	Commence 4.0	Day-Timer Organizer 2.1	ECCO Pro 4.01	Info Select 4.0
POWER				
Contact management	Good	Good	Excellent	Fair
Calendering and scheduling	Good	Excellent	Excellent	Good
Task management	Good	Fair	Good	Good
Information management	Good	Fair	Excellent	Excellent
Workgroup	Good	Good	Good	Poor
Remote	Good	Fair	Good	Fair
EASE OF USE				
Contact management	Fair	Good	Good	Good
Calendering and scheduling	Good	Good	Good	Good
Task management	Good	Good	Good	Good
Information management	Fair	Good	Good	Good
Workgroup	Good	Good	Good	Good
Remote	Fair	Good	Fair	Fair

N/A*—Not applicable: This feature requires an optional module. N/A**—Not applicable: The product does not have this feature.

Contact management features include the ability to track all necessary information about individuals with whom the user interacts. This task involves the tools for adding and importing contacts, the design and customizability of contact records, and the ability to record interaction with a contact, such as phone calls and meeting notes, in a history log.

In the **calendar and scheduling** category, we look at the capabilities of the program in adding, modifying, and deleting individual and recurring appointments, setting alarms, and printing calendars. We also look at how well the program can share calendar information with colleagues and its ability to make links between the calendar and contacts.

Task management involves the ability to prioritize and maintain tasks such as to-do items and phone calls. It also

COMMENCE CORP.

Commence 4.0

An ambitious product that combines information management and elements of groupware, Commence 4.0 (\$290 street), from Commence Corp., does a lot more than just manage contacts and schedules. With its ability to maintain contact histories and manage databases, as well as its customizability, Commence could serve as a basic groupware solution for small to medium-size businesses.

Commence offers so much that you could almost make a career out of using it. Unfortunately, you may have to devote that much time to Commence—it proved to be one of the least easy-to-use information managers in this roundup. Inadequate documentation makes learning it even harder. (Commence Corp. will soon offer an improved manual at an extra cost.)

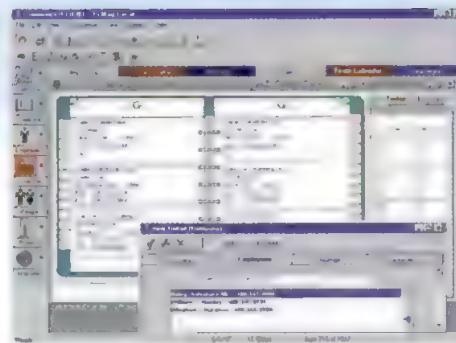
Commence can link several people with a single company, or vice versa. This ability to link contacts and organizations

in almost any way placed Commence among the best of the information managers we tested. You can create general databases in Commence to track almost anything, but setting them up can be a complex process.

The program's interface lacks the polish of interfaces of such programs as Sidekick 97 or Day-Timer Organizer 2.1. Commence offers no icon for graphical calendars and clocks to indicate that these are available. You can set recurring appointments, but the process is not intuitive. The program offers only basic default reporting capabilities, but it does let you lay out your own print templates.

We had problems importing our test database files because of Commence's "category" approach, which limits the

DEF



Commence allows you to group contacts within a company or group companies under a single contact.

types of fields that you can import. In addition, Commence imports company and contact data separately. These limitations were not mentioned in the documentation.

When it comes to customization, Commence has few equals. You can design different views of your data for desktop PCs in different departments. Agents allow you to automate repetitive tasks such as e-mailing monthly reports or alerting users to meetings assigned to their calendars.

Commence constantly monitors each client and updates the server, which in turn updates all of the other clients—all along allowing multiple users to work on the same files simultaneously. A group-scheduling feature lets you view all users' appointments, find free time, and inform attendees. Commence's networking features require a separate server edition (\$490 street). A starter kit with five clients and a server is available (\$1,595 list).

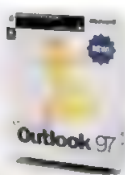
Commence relies on a rudimentary file-based synchronization scheme. The company is working on an add-on Web tool for publishing views to HTML.

Commence won't win any awards for ease of use and setup, but if you dig in, you'll find a lot.—Wayne Kawamoto

Commence 4.0. Street price: Commence Client, \$290; Commence Server, \$490. Requires: For Client, 8MB RAM, 20MB hard disk space; for Server, 12MB RAM, 40MB hard disk space; Microsoft Windows 95 or Windows NT 3.51 or later. Commence Corp., Shrewsbury, NJ; 800-688-7080, 908-530-4666; fax, 908-530-9827; www.commence.com. Circle 441 on reader service card.



Lotus
Organizer 97 GS



Microsoft
Outlook 97



OfficeTalk 97



Sidekick 97



Time &
Chaos 32 5.2

Fair	Good	Fair	Good	Fair
Excellent	Good	Good	Excellent	Fair
Fair	Fair	Good	Good	Poor
Good	Good	Good	Good	Fair
Fair	Excellent	Excellent	Poor	Poor
Fair	Fair	Fair	Fair	N/A*
Good	Fair	Good	Excellent	Good
Excellent	Good	Good	Excellent	Good
Good	Fair	Good	Excellent	Fair
Excellent	Good	Good	Good	Good
Good	Good	Fair	Fair	Poor
Good	Good	Fair	Good	N/A**

considers the management of related tasks, meetings, and contacts, and the ability to link these to other areas of the program such as the calendar and contact databases.

Information management includes tools such as outliners for data entry and organization, and the ability to customize databases with specific fields that correspond to the user's method of organizing data.

The **workgroup** task features such as the ability to share information selectively, the integration with e-mail, and group scheduling tools.

The **remote** task includes the ability to transfer all or parts of the database to a laptop computer and synchronize the data once it has changed. We also consider the program's ability to link with hand-held devices.

Decisions Decisions

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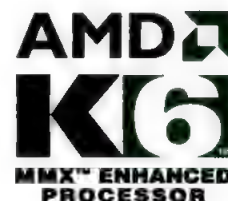
Sound Card: 3D

Speakers: 20 Watt

Software:
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MS Money and more



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Cache: 512 KB

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20X CD-ROM

Graphics Card:
PCI 2MB

Modem: 56Kbps

Sound Card: 3D

Speakers: 20 Watt

Software:
Windows95
MS Works
MS Money and more

Selecting a new computer is a dilemma when Techmedia offers a choice between two leading-edge 233MHz PC systems, with MMX enhanced technology. On one hand, there's the system built around the famous Intel Pentium processor—on the other, a system designed from the revolutionary AMD-K6 processor. Fortunately, they both offer unprecedented speed for Windows applications. They're both packed with superior memory, storage and multimedia features to make your computing experience most efficient, even fun. And, if either of these decisions sounds expensive, look again. They are available at mainstream prices. Whatever your decision, Techmedia is the right answer.

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DAY-TIMER TECHNOLOGIES

Day-Timer Organizer 2.1



Day-Timer Technologies' Version 2.1 of Day-Timer Organizer (\$60 street) continues to build on the personal task, appointment-, and contact-tracking features found in its earlier versions to provide an information manager that successfully shares these features among multiple users. It delivers modest enhancements over Version 2.0.

Current users should feel right at home with this release and welcome its additions of Internet and e-mail launches, good online help, quicker data entry, and icons that indicate links between entries. Day-Timer still lacks some of the power found in other products in this category, such as ECCO Pro, especially in the area of customization. Yet it equals or surpasses some of its competition—Lotus Organizer, for one—in functions such as history tracking.

Day-Timer's on-screen calendar, task list, and contact database modules continue to resemble the product's long-standing paper version. The opening interface takes you to the separate modules for tracking your contacts, calendars, and so forth. Data entry is simple even for inexperienced users: To add an item, you click on the action button, pull down a menu, or just double-click on a blank area of the contact record, task list, or appointment book and fill in a tabbed dialog box.

Day-Timer's database customization

Editors' Choice: Information Managers

- High-end: ECCO Pro 4.01
- Entry-level: Day-Timer Organizer 2.1



Editors' Choice.

In ECCO Pro, you store information in an outline. You can organize facts into folders and subfolders, and collapse and expand these to view details. In addition to tracking information, ECCO Pro does a solid job of tracking contacts and schedules. And a unique feature called the ECCO Shooter quickly transfers data between ECCO Pro and other applications.

capabilities vary. On one hand, its field structure is only slightly customizable. On the other, you can create categories so you can quickly view all records of a certain type, such as those related to a specific project. And Day-Timer comes with robust features. For example, the phone dialer supports multiple locations, and after dialing, it automatically generates the phone log and then attaches any notes to the contact's record. You can easily schedule a follow-up call or a future task.

Day-Timer's workgroup capabilities are solid, particularly for an inexpensive information manager. When creating a meeting, you can view other workgroup members' schedules, assuming you have access rights. It sends notification of meetings you schedule or tasks you assign via a private e-mail system that transmits messages only to Day-Timer users. Those who receive notification can accept or decline a meeting notice.

Day-Timer has customizable printing and exporting capabilities. For example, you can print or export specific records, such as your schedule, for a specific period

Among information managers there's a clear trade-off between power and ease of use. In this category, the pick for power users is once again ECCO Pro. For

those who prefer a structured, easy-to-use interface, Day-Timer Organizer is our

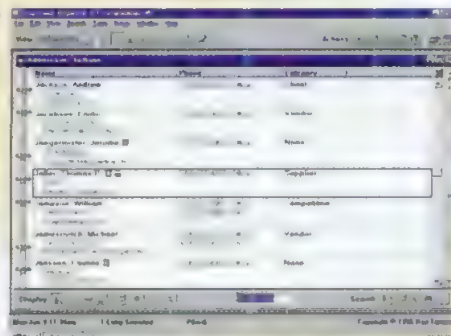
Version 2.1 of Day-Timer Organizer is an incremental upgrade that provides enhanced Internet features, faster data entry, and icons for creating links between entries. One of the advantages of Day-Timer is that it closely resembles its paper counterpart, so you'll feel comfortable using it after a very brief time. And despite its seemingly simplistic interface, Day-Timer is a surprisingly robust product, and its workgroup capabilities are strong for a relatively low-cost information manager.

of time or a list of contacts relevant to a trip. When you return, you synchronize information by importing your travel records back into the main database.

While Day-Timer's internal e-mail system is handy for communicating information about meetings and tasks, it has little support for external e-mail programs. Basically, its only e-mail skill is the ability to launch your MAPI client, such as Microsoft Exchange, with a button beside the contact's e-mail address. Day-Timer cannot store or manage received e-mail messages or place outgoing messages you launch from the program in a contact's history. Its Internet features include the ability to launch multiple URLs for each contact, as well as strong online help.

Although Day-Timer Organizer is not the most powerful information manager in this group, it will satisfy users looking for an easy-to-use and reliable package with a reasonable set of workgroup scheduling and task management skills. —David Haskin

Day-Timer Organizer 2.1. Street price: \$60. Requires: 386-based PC or better, 4MB RAM, 6MB hard disk space, Microsoft Windows 3.1 or later or Windows NT 3.51 or later. Day-Timer Technologies, Allentown, PA; 800-225-5005, 415-572-6260; fax, 415-572-9675; www.daytimer.com. Circle 442 on reader service card.



Day-Timer Organizer's interface will be immediately familiar to those who use the paper version.

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SOFTWARE

Information Managers

NETMANAGE INC.

ECCO Pro 4.01



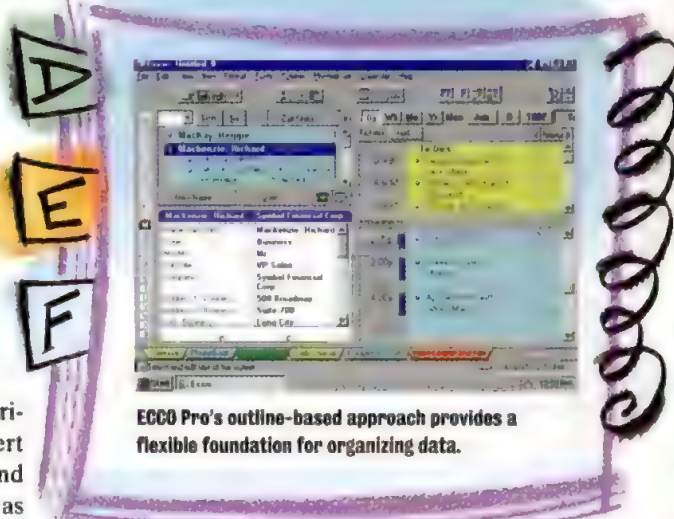
Splicing, dicing, and organizing data with Ginsu knife precision, NetManage's ECCO Pro 4.01 offers the best approach that we've seen to manage random information effectively. This latest version of ECCO Pro (\$100 street) is not the easiest product to learn or to use—certainly not as easy as Starfish Software's Sidekick or Lotus Organizer—but those who delve into it will be rewarded.

We had no problems importing our test database into ECCO Pro, which let us map our fields to ensure that all the data arrived at the right destination. ECCO Pro offers a smooth outlining approach to categorizing data. You organize facts into topics and subtopics and collapse and expand these to view details. To classify data further, ECCO Pro lets you use spreadsheet-style columns. For example, you can track tasks by assigning priority levels to them, insert dates for completion, and further customize these as you wish. Additionally, if you need one more way to view the facts, you can rely on folders to cross-reference and view topics together. All in all, it's a flexible, comprehensive approach to managing data.

In addition to tracking information, ECCO Pro does a first-rate job of tracking contacts and schedules. To track contacts, the program offers many predefined fields in its records, and you can create your own fields as well. To call up a contact, use the program's thorough search capabilities to search in specific fields quickly and apply Boolean logic to these searches. To create an appointment or to-do list, you simply drag a contact from the address book onto the calendar. When you assign a task, the program automatically lists it with the appropriate contact.

To work with external word processors and other Windows applications that support cut-and-paste, ECCO Pro offers its Shooter, a tiny arrow that appears at the top of each application when ECCO is active. You just click on the arrow to move selected information back and forth between applications.

ECCO Pro lets users share a data file across a network, so several people can view and use a master schedule and address book. ECCO Pro's adequate group scheduling feature lets users view blocks of committed time on other users' schedules to arrange meetings, but the program doesn't display details on these appointments (you can see these in another view). In our testing, we encountered a bug when we set up ECCO's networking



ECCO Pro's outline-based approach provides a flexible foundation for organizing data.

features, and NetManage acknowledged the problem and sent us instructions that required us to remap our network drives. The next upgrade, due soon, should fix this. Also note that although the manual mentions the need to create a "change" file to synchronize remotely, it turns out the procedure is much more involved and merits more attention in the program's documentation and online help.

Version 4.01 offers true 32-bit code and support for the U.S. Robotics' PalmPilot. If you are running Windows 3.x, the program's setup installs a 16-bit version. At press time, NetManage was working on an upgrade that may be available by the time you read this. Version 4.02 will offer incremental improvements to the product's scheduling, printing, and groupware features; a beta of this version is available on

the company's Web site. In the information management category—defined in its broadest sense—this version of ECCO Pro continues to set the standard.—*WK*
ECCO Pro 4.01. Street price: \$100. Requires: 486-based PC or better, 6MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or later or Windows NT 3.51 or later. Net-Manage Inc., Cupertino, CA; 425-885-4272; fax, 425-885-0297; www.netmanage.com. Circle 443 on reader service card.

MICRO LOGIC CORP.

Info Select 4.0

When you have lots of random facts to store and recall quickly later, Micro Logic Corp.'s Info Select 4.0 (\$100 street) can help you manage them as no other program can—not even ECCO Pro. But InfoSelect's contact management and scheduling features are limited, and you may find it to be too unstructured. This latest version, which should be shipping by the time you read this (we evaluated a public beta release), now offers Internet e-mail support and lets you link scheduled events with topics.

With an approach similar to ECCO Pro's, Info Select offers an outliner called Selector to organize notes within topics. Think of a topic as a subject in an outline, with the notes being the supporting points. Within the Selector, you drag and drop notes to move them between topics, which can be either collapsed or expanded. Notes can either be displayed on full pages on the right side of the screen or pinned up like sticky notes. The disadvantage to this is that you may not always feel you know exactly where your information is—you have to rely completely on Info Select's search capabilities.

Within the topics, you create and add information in the form of notes. Interestingly, Info Select even tracks your tasks under a to-do topic in the selector. But unlike all the other programs, especially contact managers, Info Select treats a database of contacts as a separate entity that is not linked to its calendar, your topics, or your notes. When you finish a to-do list or phone call, for example, you have to add the results manually to a new note.

Rather than using its own proprietary contact database, Info Select simply imports and uses external databases so that

BOOKMARK Benchmarks



www.pcmag.com

Between the PC and the Palm of Your Hand

By Bruce Brown

Contact managers and information managers can be a godsend. But if you spend a lot of time away from the office and your data is confined to a desktop PC, all the customer information, appointments, and tasks you've entered are of little use. Fortunately, you no longer need to lug a notebook computer everywhere to have this information available to you at all times because handheld devices have finally come into their own.

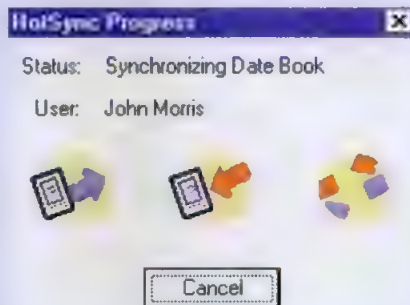
Handheld devices, generally known as *personal digital assistants* (PDAs), have been available since the mid-eighties when the first Sharp Wizards arrived on the market. But it wasn't until U.S. Robotics introduced the Pilot last year that the handheld market began to take off. The main reason is simplicity. A single button allows you to synchronize all the data between your host PC and the Pilot automatically (see the screen shot in the next column).

The introduction of Microsoft Windows CE handheld PCs (HPCs) in late 1996 further increased interest in small-format computing. Although HPCs have scaled-down versions of Microsoft Word and Excel, the key attraction of both these devices and the Pilot remains their easy integration with the desktop to take information on the go.

Recognizing the growing popularity of these devices, software vendors are now providing solutions for transferring data between them and their contact managers and information managers—either directly or via an add-on or third-party utility. Of the packages we tested for this feature, seven were able to link with the PalmPilot, including ACT! for Windows 3.0.5, Day-Timer Organizer 2.1, ECCO Pro 4.01, GoldMine 3.2 for Windows 95 and NT 4.0, Maximizer 97*is*, Microsoft Outlook 97, and Sidekick 97. We also tested the Pilot link for Franklin Quest's Ascend 97 for Windows 95 and NT (\$99.95 list; 800-654-

1776, www.franklinquest.com).

Four of the reviewed programs can synchronize data with Windows CE devices, including Day-Timer, GoldMine, Outlook, and On-Schedule. Organizer will link with the PalmPilot and ACT! will soon have a Windows



CE version, but neither was available in time for testing.

Three of the programs that work with the PalmPilot—ECCO Pro, Ascend 97, and Lotus Organizer—come with integrated linking utilities. Three others provide their own add-ins to work with the PalmPilot: Sidekick 97's TrueSync (\$29.95 list; download only) and ACT! PalmPilot Link (available for free), as well as Maximizer PilotLink (\$49 direct). ACT! for Windows CE (\$99.95 list) and Pocket On-Schedule for Windows CE (\$69.95 list) both install on the Windows CE desktop (via a host PC) as standalone applications that will also synchronize with data with the host PC running the desktop version of the software.

Three other vendors rely on Puma's IntelliSync for PalmPilot and IntelliSync for Windows CE (each version, \$69.95 list; 800-774-7862; www.pumatech.com) as third-party conversion utilities to link with their programs. If you use Day-Timer, GoldMine, or Outlook, you can use either a PalmPilot or a Windows CE, because both types of PDAs can link to the host program via IntelliSync. The IntelliSync conversion engines can translate address, calendar, and task files with additional contact manager programs as well, including some that

integrate or sell their own linking software. Because Windows CE is a 32-bit operating system that partners with a computer running Windows 95 or Windows NT 4.x, IntelliSync for Windows CE cannot run on a host system using Windows 3.1, but IntelliSync for PalmPilot can run on Windows 3.1, Windows 95, and Windows NT.

On our tests, IntelliSync for PalmPilot proved to be a dependable, flexible file conversion engine. In each case when using Day-Timer Organizer, GoldMine, and Outlook, the IntelliSync configuration interface allowed us to choose which host program to link with and then performed without error, requiring 2 to 4 minutes to perform an initial synchronization of 1,000 test records. IntelliSync uses one of two different files to link with either Day-Timer Organizer Version 2.0 or Version 2.1, but you only need to select the proper file once. GoldMine worked as expected, as did Outlook for the most part.

ACT! worked seamlessly using the free download of ACT! PalmPilot Link, as did Ascend 97, Version 6.2, with its integrated utility (note that Version 6.0 also includes the PalmPilot link). ECCO Pro, Version 4.01, also synchronizes with the PalmPilot, but earlier versions do not.

Maximizer 97*is* differs from the other programs because it uses a relational—*not flat*—database file for its records. While the relational nature of the files adds power to the main program, maintaining the integrity of the files when making the jump to the PalmPilot's flat-file database is tricky, even with Maximizer PilotLink. In order to have entries synchronize correctly with the Pilot, you have to enter a unique key in a custom field to preserve the structure of the Maximizer database.

Sidekick's TrueSync add-on links with the PalmPilot, as well as the original Pilot. You select TrueSync from the Sidekick menu bar after installation

and can configure the program to work with different field-mapping templates, which can be saved and named. On our tests, Sidekick using TrueSync was the fastest at full synchronization and roughly equivalent to the Pilot desktop on partial-file updates.

As was the case with their PalmPilot links, Day-Timer Organizer, GoldMine, and Outlook's Windows CE links were accurate and easy to use with Puma's IntelliSync for Windows CE. The IntelliSync configuration interface works the same as the PalmPilot version: You choose which host program to use to link with the CE's contact, calendar, and task files. The only notable difference was that synchronizing Outlook files with the NEC MobilePro using IntelliSync was significantly slower than with the other programs.

Odyssey's Pocket On-Schedule installs on the Windows CE desktop

and can be used instead of the standard Windows CE Contact application. The program still uses the CE's calendar and task files, however, and you can access them from within the Pocket On-Schedule application. In testing, Pocket On-Schedule synchronized with On-Schedule 97 much faster than programs that connect using IntelliSync for Windows CE.

Perhaps the best news is that in all of our testing no data was lost in either the initial download or subsequent updates. PC Labs disconnected the PDA during a synchronization update with each of the programs, and in every case both the desktop and the PDA informed the user that the synchronization was interrupted or not complete and that it should be redone.

The programs that can link to both the PalmPilot and Windows CE platforms have an edge in terms of flexibility. Users who need only a contact list

with appointments and tasks can opt for the truly pocket-size PalmPilot, while those who want more fully featured hand-held computing can migrate to a Windows CE HPC. And both can synchronize with contact data maintained on a desktop or conventional notebook system. In this regard, Day-Timer Organizer, GoldMine, and Outlook are the leaders, with ACT! to follow when the company releases the long-awaited ACT! for Windows CE.

Of course, there are other handheld devices that offer direct links or third-party links to contact managers or information managers. If you use one of the platforms not listed here—such as the Psion, Sharp Zaurus, or Apple Newton—check with software vendors to find out about links for your handheld device. With handheld devices finding their way into mainstream computing, support from software vendors should continue to evolve.

PERFORMANCE TESTS

Handheld Devices



How We Tested

To test the performance of data translation tools for hand-held devices, *PC Magazine Labs* created a comma-delimited (.CSV) ASCII text database of 1,000 records utilizing TestBytes by Logic Works, a program specifically designed for setting

up test databases. The database was imported into each program's desktop component using 11 contact record fields that were common across all applications.

The devices we used for testing were the recently introduced

U.S. Robotics PalmPilot Professional and the NEC MobilePro 400, a Microsoft Windows CE-based handheld personal computer (HPC). As these devices grow in popularity, many vendors are adding their own links. If the software vendor offered a native link to these devices, we tested that option. Otherwise, we tested the add-on or third-party solution recommended by the vendor—Puma Technologies' IntelliSync for PalmPilot and IntelliSync for Windows CE.

PC Labs timed the transfer of the initial 1,000 records to the handheld device. After adding five new contacts, one appointment, and one to-do task on both the PDA and the desktop, we measured the time it took to synchronize the updates. While the times varied, in no case was data lost during the initial download or in the synchronization upgrade test.

WINDOWS CE HPCs

Via Puma's IntelliSync for Windows CE

Lower scores represent better performance. Minutes:seconds	Day-Timer Organizer 2.1	Goldmine 3.2 for Windows 95 and NT 4.0	Microsoft Outlook 97	Pocket On- Schedule for Windows CE
Full download	8:41	9:01	13:03	6:07
Synchronization update	2:07	3:12	5:13	0:17

U.S. ROBOTICS PALMPILOT PROFESSIONAL

Via Puma's IntelliSync for PalmPilot

Lower scores represent better performance. Minutes:seconds	Pilot Desktop 2.0	Day-Timer Organizer 2.1	Goldmine 3.2 for Windows 95 and NT 4.0	Microsoft Outlook 97	ACT! for Windows	Ascend 97 for Windows 95 and NT	ECCO Pro	Maximizer 97 is*	Sidekick 97
Full download	1:49	2:27	3:45	3:58	1:39	2:02	2:49	6:17	1:25
Synchronization update	0:18	2:14	4:14	3:37	0:53	2:32	0:21	8:25	0:19

* Though Maximizer took the longest to complete these tests, it also imported more records than the rest. Maximizer's relational database maintains two records for every contact.

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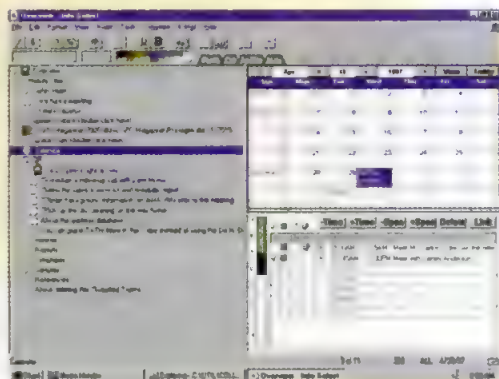
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Info Select's Selector is essentially an outliner that manages all sorts of information.

they remain separate. It can not merge files from contact databases unless they share the same exact fields. Importing our test database into Info Select was as easy as opening it.

Scheduling features are fairly straightforward, and it's easy to make appointments using the program's graphic calendar. InfoSelect's reporting capabilities are limited; you have to lay out fields on the page in the manner in which they should be printed. The program does not support external word processors (you compose letters and then perform mail-merges with its notes feature).

Info Select shares data files across a server but lets only one user edit the file at a time. Everyone else can only view it. The program does not alert you when you can start editing the file, but once you begin typing, it will notify you if the file is in use. Info Select offers no security features, nor does it support group scheduling, although users can post their address books and appointment calendars to the shared drive. In general, the program's networking approach is suitable only for small offices or for individual workgroups.

Info Select doesn't offer conventional internal e-mail; its version of this is actually more of a file-transfer utility that lets you drag and drop topics from the outliner and transfer them to other users on the network. To support users on the road, Info Select offers a basic bidirectional synchronization of all changes in notes, contacts, and appointments.

With its unusual approach and limited feature set, Info Select may lack wide-

spread appeal. But for those who record fleeting thoughts and work with a random approach, Info Select may be the perfect solution.—WK

A
B
C
Info Select 4.0. Street price: \$100. Requires: 486-based PC or better, 8MB RAM, 4MB hard disk space, Windows 95 or Windows NT 3.51 or later. Micro Logic Corp., Hackensack, NJ; 800-342-5930, 201-342-6518;

fax, 201-342-0370; www.miclog.com. Circle 444 on reader service card.

LOTUS DEVELOPMENT CORP.

Lotus Organizer 97 GS

Tying in nicely with Lotus Notes 4.51, Lotus Organizer 97 GS is emerging this year as one of the products in a promising category—information managers that integrate with groupware. If you are a Lotus Notes 4.51 user, you can use Organizer (\$80 street) as the front end to Notes' workgroup calendaring and scheduling features. Or you can use Organizer as a standalone program with more limited workgroup features.

Installing Organizer is a breeze. However, when used with Notes, Organizer doesn't share contact data because it relies on the Notes Personal Address Book, which is not shareable. The standalone side can share common contact data provided it is set up in a common location and included as an additional address section. But you still can't perform group scheduling without Notes. In addition, you won't find a few basic information management features: history files associated with contacts, automated tasks, and mail-merge other than with Word Pro.

Organizer has been known for its easy interface, and this version is no exception. The screen layout is essentially a planner-book metaphor with tabbed sections. Adding new data is as easy as double-clicking in the appropriate tab for an appointment, to-do item, note, or new contact. The ability to schedule re-

curring appointments, set alarms, and graphically plan out your time still makes Organizer one of the easiest programs to use. One of its most powerful features is the ability to link just about anything, such as a contact to a new appointment, using a SmartIcon.

With Organizer, you can really leverage the power of Notes 4.51. It taps your Notes Personal Address Book and your Notes mail file as the data sources of the Address and Calendar tabs, respectively. This allows you to take advantage of Notes' formidable group, remote, and security features. However, since Organizer relies on Notes 4.51's internal calendaring, it does not work with earlier versions of Notes.

Group scheduling appears to be handled by Organizer but actually takes place in Notes. You can invite anyone in your personal address book as well as anyone in your company address book to meetings. A multiple-calendar view allows you to see as many as 15 calendars of other users on your screen simultaneously. You can have Organizer look at the calendars you select and find a free time slot for you. Although Notes augments the security in Organizer, even without Notes, Organizer offers password protection and control over file-access privileges.

Organizer alone relies on file-based synchronization, but using it with Notes, you can synchronize all or part of selected databases to your laptop. However, the synchronization must be done via Notes, whereas we would have preferred a SmartIcon in Organizer.

If you have access to a Web server, you can use Organizer's Web Calendar for editing your calendar and other information over the Web while you're on the road. You can also link a URL to any item in Organizer.

Lotus Organizer 97 GS earns high marks for innovation by integrating tightly with Notes. But whether or not you use Notes, this version of Organizer will give you a flexible and appealing way to manage information.—Diane Jecker

Lotus Organizer 97 GS. Street price: \$80. Requires: 486-based PC or better, 8MB RAM, 15MB hard disk space, Microsoft Windows 95 or later or Windows NT 4.0. Lotus Development Corp., Cambridge, MA; 343-5414, 617-577-8500; www.lotus.com. Circle 445 on reader service card.

Java™ Computing: *A new alternative for a new millennium*



As we stand at the threshold of a new millennial age, new considerations have begun to drive corporate decisions about how to meet current and future objectives. And no wonder: today's information technologies have created many opportunities that simply didn't exist a few years ago and couldn't even be conceived a generation ago.

Chief among these technologies is, of course, the Internet and its friendliest face, the World Wide Web. In just a couple of years, this duo has transformed the way most companies think about doing business. Nearly everyone recognizes the spectacular possibilities of truly transparent, multiple-media connectivity across time, space and computing platforms.

It doesn't take a visionary to see that such straightforward, built-in connectivity between people and their information machinery means that it'll be easier and less expensive to keep customers happy, to get employees to work better with each other, to create and deliver products and services more efficiently. For a growing

A planned, incremental implementation of Java computing can finally deliver what you've long wanted from your information systems

number of organizations, Internet-inspired change is already dramatically underway as a new and flexible channel to customers, business partners and suppliers continues to broaden its embrace.

Like many new opportunities, those on the Internet and the internal corporate intranets modeled after it are most effectively and successfully pursued with new tools and techniques. After all, the old tools and techniques are designed to work best with old technologies and old opportunities.

But what corporate enterprise can possibly afford to reinvent its information technology with each new breakthrough or insight? Sure, everyone expects — indeed, wants — some incremental

investment in new capabilities. And it would be great to bring some order and sense to the chaos of environments, platforms and protocols that currently passes as an information technology infrastructure in many organizations.

Scrapping the huge investments in existing information systems, however, or tossing out entire databases of invaluable knowledge, or retraining vast numbers of workers in new computing environments and techniques is simply beyond consideration.

So what's the alternative?

Java™ computing is the alternative. It's an entirely new kind of cross-platform environment that sits atop — and works with — your organization's existing systems and networks. Later, if and when necessary, it can slowly, incrementally replace costlier, less efficient elements. The result? A rational, significantly less expensive information systems infrastructure that integrates and extends the value of what you've already got.

A planned, incremental implementation

COMING SOON TO A BANK NEAR YOU ...

"Our clients want their bank to be more available at every level to carry out banking operations during off hours," states Rudi Peeters, electronic banking officer at CERA Bank, Belgium's seventh largest financial institution. "Electronic banking is an ideal solution. Internet access is taking the well-established home banking formula a step further."

CERA's first online retail service application, written completely in Java, is a loan mortgage calculator that allows potential borrowers to estimate payments from their home computers using only a browser. Through this CERA Online service, the bank reduces loan application processing time.

The loan calculator works as most Java applets do. Customers download the application and run it on their computers, regardless of the underlying

operating system. The easy-to-use program prompts you to enter such information as loan amount, time to borrow and type of payment. The mortgage calculator then returns a payment schedule as well as a yearly breakdown of the remaining principle.

In addition to the mortgage calculator, CERA Bank customers can perform other banking functions such as transferring funds, checking account balances and consulting exchange rates via CERA Online.

Customers with Internet capabilities reach CERA Online as they would any other site. For customers without Internet access, the bank's local branches provide an online service kit, complete with Microsoft's

Internet Explorer browser, IBM's dial-up interface, TCP/IP, and security software.

A solid foundation

The bank's primary use of its new Java applet is to lure new customers. But as more online customers are added, the bank can drive down internal costs by steering more transactions to the Internet. Online transactions are significantly cheaper than those that take place at the branch or over the telephone.

Aside from the marketing use of network computing, CERA intends to consolidate its distributed internal network more centrally via an intranet that the local branches can use. The bank envisions this model

being especially important as it acquires and merges with other banks and businesses.

"Our clients," Peeters notes, "have cheap and easy access to the Internet, benefiting from maximum flexibility in carrying out their banking transactions. And CERA Bank has laid a solid foundation for many years of electronic banking."

Leverage for the legacy

CERA Bank was able to both protect and leverage its investments in IBM systems by using an OS/2 web server to enable secure IMS transactions over the Internet. CERA's centralized control allows the bank to react quickly to changing market conditions and roll out new services right away.

"Because we've chosen this technology," Peeters adds, "we can be ready very fast for alternative distribution channels, such as interactive television."



of Java computing can finally deliver what you've long wanted from your information systems: almost everything really does fit together and is easy to maintain, easy to grow and easy for even inexperienced desktop computer users to master.

Read on to find out more about Java computing and some of the many ways it's being put to work right now by companies just like yours.

THE JAVA PLATFORM DELIVERS

Unlike any other kind of computing environment, Java computing offers an architecture that leverages enterprise IT investments across all platforms. Java applications start as Java source code, which is then compiled to bytecode and next stored on a server or a local computer. In order to execute a Java application, a user invokes a Java Virtual Machine, which executes the Java bytecode. Unlike most other programming languages, Java bytecode is not platform-specific or native to any particular processor.

All of today's popular browsers contain a Java Virtual Machine including Netscape Navigator™, Microsoft Internet Explorer, and Sun's HotJava™ Browser. Java development environments also contain a Java Virtual Machine in order to test the Java code developed using them. In addition, standalone Java Virtual Machines running on desktop platforms such as Microsoft Windows, MacOS and Sun™ Solaris™ can execute Java code, and a new generation of network computers, such as Sun's JavaStation™ network computer, executes Java code directly as if it were just another program.

If you want to revitalize, not replace, your legacy systems and streamline your organization's information handling with an enterprise intranet, you need Java technology. And if you want to exploit emerging opportunities in Internet-enabled commerce, Java computing is key.

Here's why:

- **Powerful portability.** Modern and object-oriented, the Java language comes with an efficient and powerful combination of interfaces that work well with standard distributed programming models. The Java environment's own standards-based platform-neutrality at both source and binary levels means it's inherently portable. And because the Java platform includes a language as well as a set of standard class

CSX BOOSTS CUSTOMER SERVICE WITH JAVA COMPUTING SOLUTIONS

CSX Corp. is proving that it can dramatically improve customer service and increase revenues while reducing operational costs. As the largest global freight transporter in the nation, with revenues over \$10 billion, CSX has long recognized the importance of its customer relationships. One way to strengthen these ties is to give customers a better and faster way to place shipping orders, as well as an ability to track shipments en-route. So the company developed a "transportation workstation" application, called TWS, which was written in C and deployed on the OS/2 platform.

While TWS has been successful in its mission, it faced practical limits to the number of nodes that could be cost-effectively deployed.

With the emergence of web-based technologies and Java computing, CSX saw an opportunity to revisit its business model by deploying a much more cost-efficient solution to its diverse population of users.

"Java computing has been a breakthrough for our business because our business model is changing," notes John Andrews, president of CSX Technology. "We're becoming much more customer-centric, which has caused us to become much more network-centric. Once you have the network in place, Java desktops are literally plug-and-play."

Improving business relationships

A new Java based application, dubbed TWSnet, was a big success and has since been enhanced to provide a wide variety of internal services, including rail car and tanker management, service history and fleet management, even some common desktop productivity tools such as e-mail and a contact database. For customers, the service palette includes waybill entry, shipment tracking, and damage claims with selective

access to the company's mainframe database.

Fast, responsive deployment of business-critical apps

TWSnet was initially developed and deployed for less than \$1 million and was implemented in a constant delivery rollout just 90 days after the project began. The first release included shipment-status queries, e-mail, access to the corporate address book, customer account information and an interactive shipment tracking map. The second TWSnet release included freight-car ordering, freight claims and bill-of-lading submissions. The current release adds equipment pool management, performance monitoring and pricing information.

Today, Java computing is being favorably evaluated in 15 of CSX's largest customer

sites on Java enabled browsers on PCs. At CSX, JavaStation network computers from Sun Microsystems run the HotJava Browser, and TWSnet lives on a dedicated Sun UltraSPARC™ 170 server behind the corporate firewall. Information resides in an Oracle database that also runs on an UltraSPARC server and receives regular updates from the IBM series 9000 mainframe.

"Java came out on top," says Andrews of his rigorous evaluation of current technologies. "It allowed us to get our information product to market much more quickly and effectively."

Now it's possible for CSX to extend electronic links to more users than ever before. Immediate deployment can be made to any existing PC users with a Java enabled web browser.

"Frankly, Java makes supporting the desktop much easier from a systems standpoint," Andrews says.

Show me the money

"Java enterprise computing has saved us well over \$5 million on an annual basis," asserts Andrews.





KEEP MOVING! JAVA COMPUTING HELPS WEB TRAVEL SITE

Providers of online travel services face tough competition and ongoing pressure to offer the best.

Travelocity, (<http://www.travelocity.com>) co-created by Worldview Systems and SABRE Interactive, is the leading provider of travel reservation and destination information on the Internet, with a user base in excess of 750,000 registered members.

"We needed to have better direct database access for delivery of information on the fly," says Neal Checkoway, president of Worldview Systems. "At peak times, typically around noon, things would slow down appreciably."

For its solution, Worldview turned to Java computing and KIVA Software, a leading provider of Internet application server software for developing and deploying web-based, business-critical applications.

Using the KIVA Enterprise Server SDK and KIVA Enterprise Server, Worldview required less than four months to replace its CGI/Perl scripts with a web application written in the Java language, and running on KIVA Enterprise Servers. Located between Travelocity's web servers and their multiple databases, the KIVA Enterprise Server processes user requests, retrieves realtime data from databases and displays it in a customized fashion.

Unlike earlier versions of the Travelocity website, in which data was static, customers now access content generated dynamically from Travelocity's numerous databases. Capitalizing on the KIVA Enterprise Server's powerful performance features, Travelocity now delivers quick response times to customers even under peak loads.

"We use the KIVA Enterprise Server's transactional and dynamic database access capabilities to deliver highly interactive content and comprehensive online travel facilities to Travelocity customers," says Worldview's Checkoway. "As a provider of the most popular travel and reservations site on the web, we rely on the scalability of KIVA Software's solution to support Travelocity's large and growing customer base."

To find out more about KIVA Software Corp., visit <http://www.kivasoft.com>.

libraries, it's easy to build powerful, mission-critical applications that run on any Java Virtual Machine in any environment.

- **Reliable, next-generation efficiency.** Java applications run on all platforms and networks without needing any modification — a seamless environment reaching from server to client to cell phone and beyond. Thanks to the Java platform's virtual machine orientation, Java applications are easy to transport across Internet/intranet environments.

- **Ability to add value to existing systems.** With Java enabled web servers acting as gateways to your existing systems, HTML can be used as a way to publish information both within your organization as well as to suppliers and customers. After that, it's easy to incrementally advance your organization's adoption of online technologies and electronic commerce.

- **Safety and security.** Java computing encourages good software engineering practices. So despite its power, the Java language is actually a safer development environment than low-level languages like C or C++. The Java environment also features important built-in security, including strong memory protection, encryption and signatures, rules enforcement and runtime verification. The Java platform protects its users by placing strict limits on applications to prevent malicious actions.

The Java platform's security allows a user to import and run applications from the web or an intranet with little risk, since a Java application's actions are restricted to its "sandbox," an area of the web browser dedicated to that application and within which it may do anything it wants. But a Java application can't read or alter any data outside its sandbox. Hence users can run untrusted Java code without compromising their trusted computing environments. And if a user does accidentally download a hostile application or applet, the local machine will not be damaged.

- **Simplicity and familiarity.** The Java language is far less complex than C++, while retaining most of its power. Since Java language syntax and semantics borrow liberally from the widely-used C programming environment, the Java language is already

familiar to an enormous and quickly expanding population of developers, even though it's very new.

"Java is so much more than just a programming language," says Shaun Maine, chief technical officer of Sanga International Inc. "It's a platform that encompasses database access, GUI control, security, network services and directory services — all of which allows a focus on business logic instead of just mundane programming tasks."

ENABLING EFFICIENT WEB COMPUTING

"We know our customers want to build and deploy mission-critical, performance-oriented business solutions that can fully exploit the Internet," notes Ken Nicolson, vice president of marketing at KIVA Software Corp. "Java is by far the language of choice for those developing the next generation of web-based business solutions."

KIVA Software (<http://www.kivasoft.com>) offers KIVA Enterprise Server, one of the industry's most comprehensive Internet application servers. It fully integrates system and application services to offer a superior architecture and application foundation that facilitates rapid development of high-performance, scalable business applications for the Internet.

Taking it to the enterprise

"The ubiquitous deployment potential of Java computing and KIVA's software," says Nicolson, "has enabled our customers to quickly extend their existing application functionality through the Internet."

With hundreds of thousands of programmers already conversant in the Java language, the variety of ways you can use the Java platform to exploit web computing's vast potential expands virtually daily.

An example is PlaceWare Inc.'s Auditorium. The first in a series of realtime applications enabling large groups of people to communicate and interact on the web, PlaceWare Auditorium (<http://www.placeware.com>) has everything a presenter needs to make highly interactive multimedia



presentations using Java enabled browsers. Participants can talk with each other, ask questions, vote and listen and respond to presentations.

Java computing is also well-suited to traditional business-critical applications.

Infospace Inc. (<http://www.infospace.com>), for example, offers several Java based decision support products, including SpaceSQL, SpaceOLAP and SpaceCharts.

SpaceSQL is a Java based intranet decision support solution with native access to the industry's leading relational databases, data marts and data warehouses. Requiring no installation, configuration or maintenance of client software, SpaceSQL allows companies to design, run and publish queries, reports and interactive Java computing charts to thousands of users via web browsers.

Powered by a scalable, multi-threaded Java server, SpaceSQL emulates the three-tier client/server model on the intranet, offering client-to-database persistence, data caching and server load balancing.

Infospace's customers are pleased.

"At Cisco," says Cisco Systems senior application engineer Nisfan Nawaz, "we take a keen interest in network performance — especially our own. We evaluated several options before choosing Infospace's server-based solution, not only for its efficient use of bandwidth, but for sheer ease-of-use. With just one day of training, our entire team was producing interactive charts and graphs of operational data to publish throughout the organization."

"Java is a key component of Cisco's overall IT direction and strategy. Cisco partners very closely with Infospace and their innovative Java technology to solve our critical business problems," Nawaz explains.

Write Once, Run Anywhere™

Java computing puts object-oriented programming to breakthrough use: downloading nuggets of Java application code from server to client on demand, regardless of the platform.

"Because of Java," points out Sanga International's Maine, "there is no platform-specific code. One version of our software runs on any hardware. Compare this to software written in C or C++, which has to be rewritten

for 14 different platforms — immediately you've increased both cost and complexity.

"In addition to the fact that our customers will be able to run their Java servers on any hardware," he explains, "their client can be any browser on any platform, anywhere. Now any of your Java applications can be used not only over your corporate intranet, but extended to a corporate extranet, worldwide, without having to write even one line of new code."

Since Java applications normally reside on a server and are delivered to a client via standard network protocol only when needed, both application code and client data storage

can be centralized on servers, along with administration and configuration control, enabling organizations to increase the cost-efficiency of their information systems infrastructure.

MUST-HAVE CONNECTIVITY

Existing systems and data interoperate easily with Java enabled computers, so you can build Java computing frontends onto your current systems and take advantage of the benefits of Java computing while protecting your investments in hardware, software and training. Thus a commitment to the Java platform can empower you to revitalize your IT infrastructure without forsaking any of your current IT investments. You can simply add appropriate Java computing capability to achieve the integration and control you need.

Extending system value with Java computing

The Java platform is particularly effective when an organization needs to access existing databases and transaction systems as well as new applications, since the Java platform has been extended to connect to databases as well as to CORBA-based object servers and other object servers.

In addition, many of Sun's Java computing allies have developed other useful connectivity tools. So, if you need to integrate Java applications with databases, legacy environments

HP INTRANET BOASTS JAVA BASED INTERACTIVE TRAINING

"We want our project teams to leverage the technical expertise of our most knowledgeable engineers and allow them to work cooperatively on a customer problem, indifferent to wherever the engineers are geographically located."

So explains Garry Orsolini, engineer/scientist for Hewlett-Packard's Worldwide Customer Support Operations, as he describes the decision to pursue a significantly new approach to communicating with employees all over the globe.

"We found that for time-constrained professionals, if something isn't as easy as picking up a telephone and communicating, it won't be adopted by the masses," says Orsolini.

Then came Java computing and PlaceWare Auditorium, a Java based conferencing product that permits presenters to make highly interactive multimedia presentations to audiences of all sizes using Java enabled web browsers.

With a nod to the "powerful experience of having text, graphics, audio and navigation all fully integrated within one environment on the desktop," Orsolini says about PlaceWare Auditorium: "The sum of the parts is greater than the whole."

Using the PlaceWare environment, the five-member HP project team constructed the Hewlett-Packard Desktop Classroom, a fully-integrated and interactive intranet-based application to train HP customer service professionals in a realtime global-community setting.

Written in the Java language and deployed on HP's main NT Netserver, which hosts both the HP website and PlaceWare components, HP Desktop Classroom allows the company to train more than 3,500 frontline support engineers in a timely and interactive manner. Employees benefit from a dynamic classroom setting that allows use of standard graphics and animation as well as an ability to time-stamp events, thus linking together corresponding slides, text and audio tracks.

For more information about PlaceWare and its products, visit <http://www.placeware.com>.



or object application code, you'll find many Java development solutions to choose from to create the completely integrated environment that's so critical to your company's future.

Boosting the bottom line. Sanga International, Inc. (<http://www.sangacorp.com>) is focused on improving the corporate bottom line in a wide variety of industries, including telecommunications, financial services, transportation, energy and healthcare. Its packaged Java applications that allow businesses to protect and extend the value of existing IT investments while also initiating Java based network-centric computing.

Sanga Enterprise Solutions address the growing need for enterprise-caliber, transaction-intensive Java applications by incorporating companies' unique business rules, accessing virtually any data source (including legacy mainframe data) and

delivering customized application interfaces to any browser over existing network infrastructures.

Solving the problems of heterogeneous computing. Random Walk Computing, Inc. (<http://www.randomwalk.com>) offers Java consulting, system integration, custom development, products and training services focused on financial and healthcare industries. Clients include J.P. Morgan, GMAC and Mount Sinai Hospital.

"Our customers tend to have dozens, even hundreds of applications deployed throughout their enterprise, running on everything from Sun Solaris to Windows NT, from mainframes to VAX machines — all being accessed from locations around the world," explains Eric Lehrfeld, Random Walk's director of business development. "Java and web technology allow them to solve many of the massively

expensive problems associated with this sort of heterogeneous computing."

New York City's J.P. Morgan & Co., for instance, entrusted the Java platform with some of its core business operations recently when it launched a Java application dubbed Emerging Markets Debt Option Pricing System, which delivers realtime updates concerning Morgan's derivative products to its sales reps' and clients' web browsers worldwide. The application took just two months to develop.

"Random Walk's business is problem solving and our customers want effective solutions," says Lehrfeld. "If there's a vendor whose software can help us provide those solutions, we want to know them and work with them."

Open Horizon worked closely with Random Walk to develop Market Watch, a pure Java realtime push-media system can securely publish to thousands of

BEGINNING AT THE END: HOSPITAL INTRANET EXPANDS WITH JAVA COMPUTING

New York City's Mount Sinai Medical Center needed to speed up one of its grimmer internal processes: issuing death certificates. Other hospitals in town handled the chore in as few as one or two hours. But at the city's largest acute care hospital, the task took five or six hours to complete. If Mount Sinai could speed up the process, then the freed-up resources could be devoted to patients still alive.

"In 1996, a cross-departmental internal team decided that re-engineering was the answer. Ways to streamline internal procedures were identified and these, the team decided, would be implemented in a document workflow system replacing the handwritten and typed certificate passed by hand from clerical staff to doctors to the Medical Records Department.

Workflow via intranet

Charles Bonomo, the hospital's director of clinical technology, saw this need for a document

workflow system as an opportunity to exploit Mount Sinai's newly-built intranet. Bonomo wanted to take advantage of the intranet's infrastructure of web browsers, web servers and SQL databases to deliver applications quickly and inexpensively.

In addition, he wanted the new workflow system to be written in the Java language, which was ideally suited to Mount Sinai's intranet environment. Java applications run on any machine without re-coding or recompiling, an important capability in Mount Sinai's heterogeneous computing environment. Also, the ease and speed with which network-savvy client/server applications can be built in the Java environment was important.

The hospital chose a solution developed by Random Walk Computing, the leading east coast Java development firm that had built the hospital's intranet.

Random Walk's Death Certificate system is expected to reduce the cycle time of the process by as much as 80%. It allows the chain of authorization involved in issuing death certificates to access their workflow from any station connected to the hospital's intranet, eliminating the need to install special software on each machine.

Bringing Java computing to healthcare

To deal with the high volume of communication necessary between various hospital systems,

Mount Sinai had developed a C++ library and message parser that allows applications to communicate in HL7, a widely used healthcare messaging standard. These messages are routed over the network through message brokers and interface engines. So Random Walk integrated Mount Sinai's HL7 interface with the death certificate automated workflow.

That's only the beginning. Random Walk has also entered into a long-term relationship with Mount Sinai to create and support Java computing versions of the entire Sinai suite of HL7 utilities.

"What this means," notes Mount Sinai's Bonomo, "is that we can now roll out many different clinical and administrative applications built to run over the network — with all the time and cost-saving benefits of Java technology."

For more information about Random Walk Computing, visit <http://www.randomwalk.com>.



simultaneous subscribers over the Internet or through internal networks.

Java development tools for every need

Already, the variety of available Java development tools is so broad that you'll have no trouble finding the right toolset for your needs. To select the best Java development tool for you, focus on three criteria: developer experience, application type and development platform.

Java code without Java programming. Unify Corp.'s (<http://www.unify.com>) recently announced VISION/Web is the first advanced client/server development environment to generate Java code without the need for Java programming and includes powerful application management capabilities for high-end applications, so administrators can centrally manage distributed applications without help from developers. Unify VISION/Web applications are management-ready and allow end-users to measure and control the total performance of their business-critical distributed applications.

Carla Schneiderman, Unify's vice president of marketing, notes many reasons customers like the Java platform and particularly cites "the ability to move existing client/server applications to the web immediately."

Leverage for business-critical applications. Building on extensive experience in distributed systems and high-level security, Open Horizon, Inc. (<http://www.openhorizon.com>) offers software products and services that enable development organizations to leverage the Internet as a platform for business-critical applications.

Open Horizon's Ambrosia Event Management System, which has been certified as 100% Pure Java™, is the first event management system for business applications within an enterprise and across the Internet. Ambrosia provides core services, including publish/subscribe messaging, guaranteed message delivery, comprehensive security, centralized administration and transactional support.

Development organizations using Ambrosia can quickly build distributed business systems in which individual applications or components can securely and reliably communicate discrete information "events" to other users and applications on the network.

MAINTAINING SAFETY WITH A JAVA COMPUTING SOLUTION

Compliance with European guidelines and governmental regulations on hazardous material documentation is a complicated but essential task. Hoffman La-Roche, a Swiss multinational manufacturer of chemicals and pharmaceuticals with over 60,000 employees and operations in more than 100 countries, was struggling to ensure the timely delivery of safety information. That often took weeks to copy and distribute. Sometimes it was actually obsolete before it reached its destination.

Initially, Roche used a report writer to print its safety data sheets and distribute them to employees. Soon, however, printing and distributing the paper data sheets became unwieldy and employees could never be sure they had the most accurate and recent information.

The need: Cost-effective, flexible, cross-platform

After looking at an assortment of solutions, Roche concluded that the various proprietary document handling systems it checked out were too restrictive, expensive and hard to use.

Roche wanted a solution that would be cost-effective, so the company could keep collection and dissemination of data reasonably economical.

The new solution also had to be flexible enough to handle a range of data types — including textual descriptions, graphics of molecular composition and specific caution notices for a large number of substances.

Finally, the solution had to function across Roche's heterogeneous computing environment so employees would be able to access it from any computing platform worldwide.

The answer: Java computing

Roche turned to Ergon Informatik, a foremost software development firm and systems integrator based in Zurich,

Switzerland, which created a Java based application that retrieves product safety information from the corporate database and rolls it up so that it can be instantly browsed by Roche employees worldwide. In this way, datasheet information remains current and much of the expense of distribution can be eliminated.

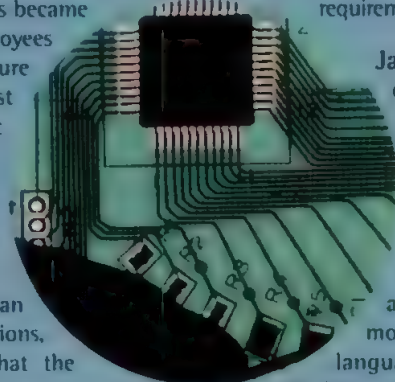
"Java computing offers the advantage of cross-platform deployment and combines many new technologies, including object-oriented programming, module orientation and garbage collection," explains Patrick Burkhalter, president of Ergon. "That's why it meets our development requirements so well."

Java computing development efficiency

"Our programmers working in the Java language are nearly four times as productive as those working in more conventional languages," Burkhalter discloses. "The language is simple and the GUI is easy to use. You don't have to worry about memory leaks and pointer errors like you do with C or C++."

Projects that take Ergon staff a month to complete in C require just a week using the Java language. The Java platform also enables Ergon to build hardware-independent products and enjoy an ease of use not available from any other source. No wonder Burkhalter estimates that within two years, over 80% of Ergon's work will be written in the Java language. He expects that the company will abandon C and C++ almost entirely, except where it's absolutely necessary.

"Java computing is not only the language of the future," Burkhalter declares. "It's the operating system of the web."



Developers at Open Horizon find the Java language to be the most productive for complex applications. It's ideally suited, they say, for building object-based business applications running on the Internet and corporate intranets.

WHY 100% PURE JAVA COMPUTING?

Java platform-independence and other strengths work as long as everyone continues using the same Java computing standard and resists the urge to add non-uniform features that destroy its portability.

The dangers of contaminated Java products

Contaminated, non-standard Java technology loses its platform-independence and its ability to ensure a secure computing environment. Which means that contaminated Java technology simply isn't Java technology at all. But some might still claim it's Java computing, even though it's a proprietary knock-off that can't do the job.

"100% Pure Java means that 100% of Java's benefits are available to a system," notes Random Walk's Lehrfeld. "Once you begin using native code, those benefits begin to disappear."

This is always a risk. In Microsoft's ActiveX component software strategy, for instance, Java applets are swallowed whole (encapsulation) and are no longer able to run on anything but Microsoft's proprietary Win32 platform.

Many believe that genuinely platform-independent computing depends on establishing and enforcing open, nonproprietary standards for the Java platform. Both end-users and developers need assurance that programs written in the Java language really will run flawlessly on any Java compatible platform or device.

The 100% Pure Java Initiative

That's why more than 100 vendors, led by Sun Microsystems, have launched the 100% Pure Java Initiative defining an objective, consistent portability standard

for Java applications. Only products that have achieved 100% Pure Java certification can exhibit the "100% Pure Java" logo.

"100% Pure Java certification will differentiate companies like Sanga, with our real, pure Java solutions, from all of the smoke in the marketplace," says Maine of Sanga International. "There are many others who claim to have competitive products, but may write their server component in C or C++ — therefore not getting any of the benefits of Java computing. Sanga's Enterprise Solutions will be even more valuable with the 100% Pure Java logo by its side."

Maine continues: "100% Pure Java is especially relevant to the server side. You can put a Java server on any hardware and incorporate any corporate



database. Customers will no longer be held hostage by vendors and can now plan to incorporate any revolutionary new hardware into their shops, secure in the knowledge that their applications will run on anything."

The 100% Pure Java Initiative uses a variety of testing certification, technical assistance, education and co-marketing programs to create and support a compatible Java environment. When you see the 100% Pure Java logo, you know you'll get:

- **Multiplatform capability: not just "Wintel," and not just the Mac.**
- **Higher-quality Java applets, applications and components.**
- **Greater satisfaction,** because you'll be able to recognize products that won't jeopardize your organization's cross-platform computing capabilities or the security of its transactions.

Already several products have won the right to carry the 100% Pure Java logo, including Open Horizon's Ambrosia, IBM's Host On-Demand, Corel's Office for Java and Oracle's Developer/2000 Web Cartridge.

"With the 100% Pure Java logo," declares Sanga's Maine, "you won't have to question the purity and portability of software you're considering."

Open Horizon president and CEO Nicholas Zaldastani agrees. "Whole industries are relying on the emergence of technologies that can synthesize information from disparate sources," he says. "Java based applications, like those built with our Ambrosia Event Management System, can run anywhere, can draw on corporate databases and wire services, and can publish findings to thousands of subscribers securely over the Internet."

Java computing completes some of IT's most important trends. Already, the Java environment has been put to work linking diverse networks and architectures and migrating processing power from mainframe and desktop to network, all the while balancing the needs of systems administrators, end-users and the enterprise.

Some of the most challenging problems facing your organization can be solved by Java computing. And you don't need to replace current IT investments to benefit from the Java platform — you can revitalize your existing IT environment by simply adding appropriate Java computing capability incrementally, as the enterprise's needs dictate.

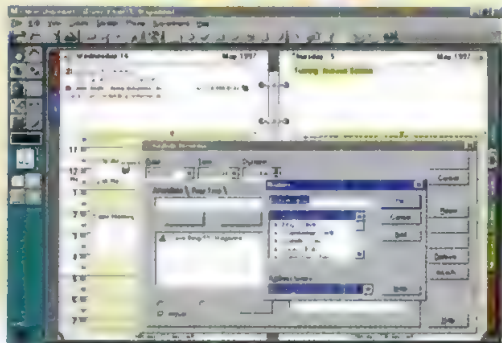
"The goal of all business is to achieve greater profitability in some way, either by increasing productivity or decreasing expense," Random Walk's Lehrfeld reminds us, "and the Java platform is an especially versatile tool for providing those benefits."

If you have questions regarding the 100% Pure Java program please send them by e-mail to 100percentpure-program@java.sun.com. You may also call 1-800-JAVASOFT (outside of North America call 1-512-434-1591).



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Lotus Organizer 97 GS leverages the power of Lotus Notes 4.x for group scheduling.

MICROSOFT CORP.

Microsoft Outlook 97

The new kid on the information-manager block, Microsoft Outlook 97 is a promising product in today's e-mail-crazed world: Outlook (\$100 street) integrates your personal and workgroup e-mail automatically with appointments, contacts, and tasks. As a first-release product, Outlook is still a work in progress.

You can buy Outlook, a Windows 95-only product, as a standalone version or as part of Microsoft Office 97 or Microsoft Exchange 5.0; it requires Exchange Server for workgroup use. If you invest time and money in Exchange Server, Outlook rewards you with thorough workgroup scheduling capabilities.

In Outlook, you view one module (contacts, calendar, and so on) at a time, and a list of either icons or folders to the left provides quick access to other modules. Drag-and-drop enhances interactivity between modules. Storing contacts, appointments, and to-do items in a folder system (such as e-mail) simplifies tasks like linking an e-mail message to a contact. To do that manually, you simply drag the message to an open contact record.

Additionally, Outlook can automatically add e-mail that you send, tasks you assign, meetings, and phone calls to a contact's history. These linked items are available both in the Journal tab of the contact's record and in the built-in Jour-

nal folder, which collects journal entries for all contacts and acts as a history log.

The Journal is more extensive—though noticeably slower—than the history logs found in most other information managers and even rivals high-end contact managers. Outlook integrates with any MAPI service providers. You can attach files to contacts and activities or add them to e-mail messages via drag-and-drop from Outlook's Explorer window. As a first-generation product, Outlook suffers from some omissions and rough edges. Unlike Day-Timer, for example, Outlook has no built-in mail-merge capabilities. Although Word can recognize the Outlook Address Book as a mergeable type of data, Outlook indicates that you must go to Word to mail-merge only in the help section. (Outlook doesn't work with any other word processors.)

Searching in Outlook is powerful but can be cumbersome. Accessing someone's record is done quickly by typing that person's name in the contact list. However, to search on any other field or to frame Boolean queries, you must use a separate interface that resembles Windows 95's Find dialog box.

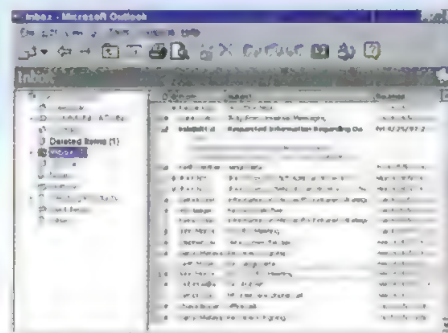
For group scheduling with Exchange, Outlook finds available time for all workgroup invitees and sends e-mail asking them to accept, decline, or tentatively accept attendance. Similarly, you can assign tasks to others, and if they are workgroup members, they can respond by accepting or declining. It also sends e-mail meeting and task notifications to workgroup non-members, but unlike Sidekick, it has no re-

sponse mechanism in those cases.

Outlook's reliance on Exchange Server has shortcomings. Most notably, travelers must use Exchange Server for file synchronization. That means standalone users who travel cannot synchronize their Outlook databases when they return unless they copy a potentially very large Exchange database folder file (.PST file) manually.

Outlook holds promise. It offers more features than Time & Chaos 32.5.2 and is more customizable than Day-Timer Organizer 2.1, but for now it probably appeals most to Exchange Server users who want to take advantage of Outlook's group scheduling and workgroup features.—DH
Microsoft Outlook 97. Street price: \$100. Requires: 486-based PC or better, 8MB RAM, 31MB hard disk space, Microsoft Windows 95 or NT 3.51 or later. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; www.microsoft.com. Circle 446 on reader service card.

A
E
F



Outlook uses Exchange's system of folders and user profiles to integrate e-mail with your schedule, tasks, and contacts.

SAREEN SOFTWARE

OfficeTalk 1.51

A 16-bit British import, OfficeTalk 1.51 (\$75 direct) is chock-full of well-thought-out, unique workgroup information-management capabilities. However, its rough edges must be smoothed out before it will become as popular on this side of the Atlantic as it is in Europe.

Setting up OfficeTalk can be tricky. It refused to import our comma-delimited database file because some fields had quotes around them, a problem that did

After you've done your spreadsheet, take it for a spin.



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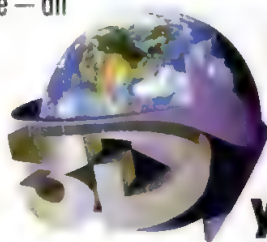
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not affect most of the other products in this roundup. After tweaking the file so it would import, we still had to perform the action twice because, like Commence, OfficeTalk imports contacts and their related companies separately.

Once we ramped up, we were impressed with OfficeTalk's workgroup power and ease of use. The group sched-

OfficeTalk's project management capabilities equal those found in many contact managers. In a separate view, you can create projects with an unlimited number of subtasks, each of which you can assign to workgroup members. OfficeTalk sends e-mail messages to notify members of tasks delegated to them, but they cannot accept or decline them. They can, how-

ever, accept or decline meetings. You can view a single project and all the subtasks in a time line.

Road warriors will find some of OfficeTalk's remote features lacking, as synchronization capabilities are not particularly flexible. You create a database of your own to copy it to your laptop. When you return from your travels, you transfer the off-line database to a local directory or folder and syn-

chronize it with the master database, a cumbersome process. OfficeTalk prints data in Filofax formats but not directly into other day planners popular in the U.S., such as Day-Timer.

Sareen Software acknowledges that this version of OfficeTalk is primarily a beachhead in the U.S. market and that an upcoming 32-bit version, due out by year's end, will correct many of the current omissions. Given its already strong workgroup capabilities, OfficeTalk could become a serious contender in the information management arena.—DH

OfficeTalk 1.51. Direct price: \$75. Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later or Windows NT 3.51 or later. Sareen Software, Middlesex, England; 800-747-5914, 0181-423-9434; fax, 0181-423-9438; www.sareen.com. *Circle 447 on reader service card.*

STARFISH SOFTWARE INC.

Sidekick 97

A longtime player from the DOS days, Starfish Software's Sidekick 97 has evolved into a professional, highly polished, and easy-to-use information manager. It offers one of the most intuitive graphic interfaces around, and at a street

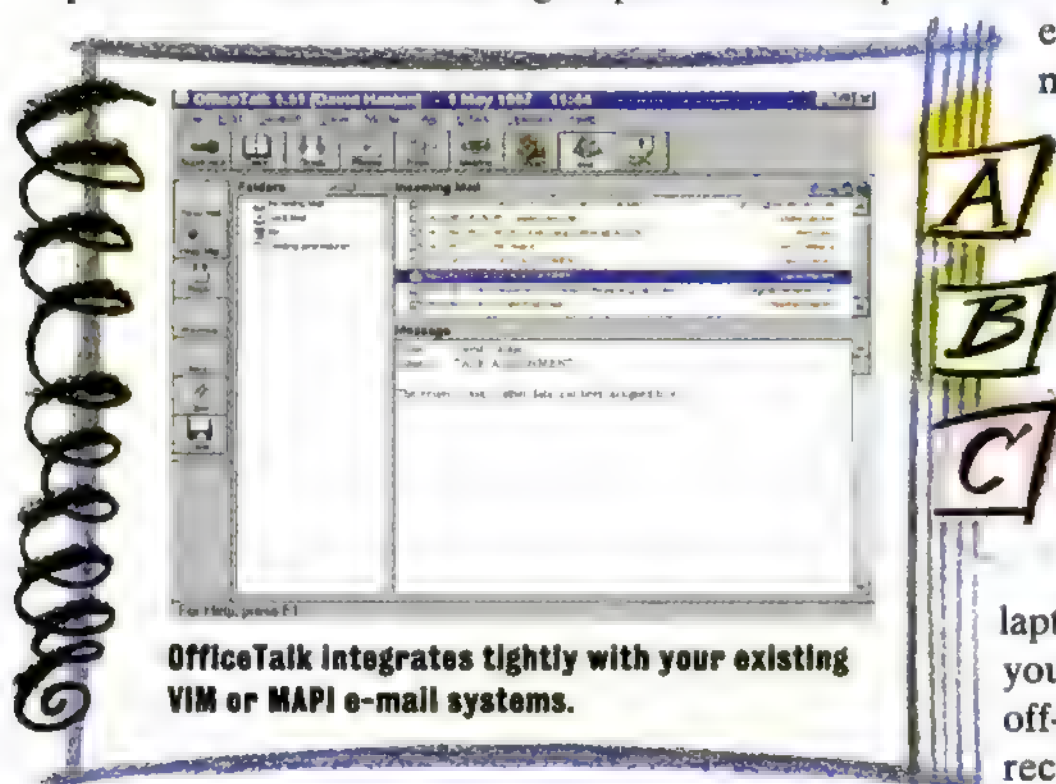
price of \$50, it's a super value. Sidekick does a great job of managing contacts and maintaining schedules. However, even though it provides some group scheduling features via the Internet, it's best suited for individuals rather than workgroups.

We were able to import our test contact database file into Sidekick without a hitch. Its great mapping feature lets you graphically connect lines between fields to generate a very slick import process. In addition, combining databases within Sidekick was a simple matter.

Sidekick offers yearly, monthly, weekly, and daily calendar views, and it tracks to-do items. It lets you schedule a new appointment by simply dragging and dropping a contact onto a calendar date (which creates a link, as with phone calls, but not with to-do items). However, we found some instances where the program didn't indicate, via its icon, where we could drop data.

Sidekick can't share data across a network, but it does offer an innovative group scheduling feature that works via Internet e-mail. Using this approach, you can schedule meetings from within Sidekick, designate attendees, and send invitations. Invitees using Sidekick can read the message, accept or decline, request a new time, or delegate the meeting to someone else, and then send the message back. When the invitee accepts an invitation, Sidekick automatically inserts the appointment into the person's calendar. Invitees who aren't using Sidekick receive a generic e-mail message that asks them to mark an X to indicate their attendance. Sidekick automatically compiles a list of attendees or, in the case of a rescheduling, looks for a new time on everyone's calendars—though it doesn't automatically search for free time.

Other than the e-mail scheduling feature over the Internet, Sidekick offers little in the way of networking features: It cannot share contact and calendar files, delegate tasks, or view others' schedules. Like contact managers, Sidekick has a contact log where you can automatically record phone calls. The built-in phone dialer can automatically insert information on phone calls into contact records. However, Sidekick can't link to-do items and appointments with contacts, and it



OfficeTalk integrates tightly with your existing VIM or MAPI e-mail systems.

uling capabilities are particularly robust. OfficeTalk helps you find free time for all invitees, then notifies them of a meeting. An added touch is the ability to include an agenda for the meeting. When the meeting notification message arrives via internal e-mail, invitees can view the subject, the other invitees, and the agenda. The notification also tells invitees if the new appointment conflicts with others.

OfficeTalk can replace your normal e-mail client; it tightly integrates with MAPI and VIM systems and includes its own module for sending, receiving, and managing messages. On our tests, it used the Exchange client address book, folder system, and store of messages flawlessly. The internal mail module also supports public bulletin-board folders for sharing message threads, and it routes mail to workgroup members in the order you specify. We also liked its general notification feature, which uses an internal store-and-forward mail mechanism to send other workgroup members general messages.

On the downside, when logging on to a MAPI system under Windows 95, OfficeTalk is very confusing. For example, it asks for a user name when it really is asking for an Exchange client profile name. This process is poorly documented, and the online assistance did not help.

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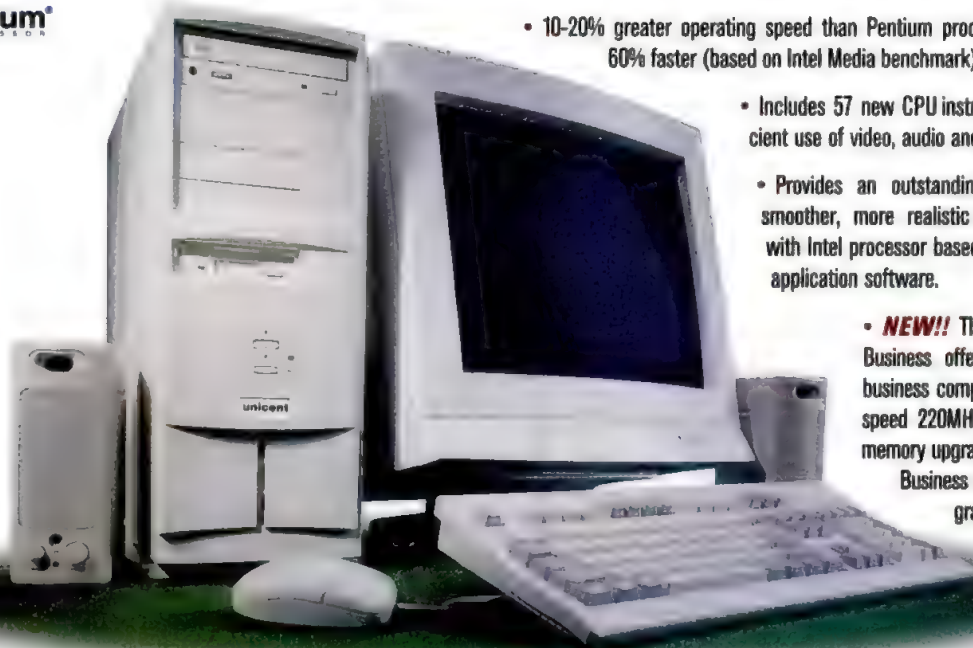
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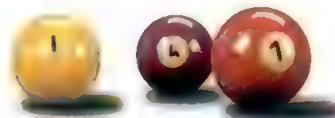
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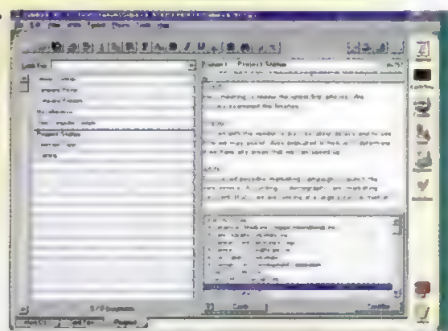


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Sidekick 97's contact manager displays all related tasks and appointments in a single window.

handles random data only through its Write module, a simple word processor.

Through the add-on Sidekick Web Publisher (\$49.95 direct), Sidekick can publish its calendars and contact databases as HTML documents so they can be posted on the Web or on an intranet. To create these static HTML documents, you simply follow an easy step-by-step wizard that walks you through the process. On our tests, Sidekick with Web Publisher was prone to system crashes when we used an earlier release of Windows 95 or versions of Internet Explorer prior to 3.0.

Sidekick 97 boasts one of the most intuitive interfaces. It's a solid product for managing contacts and schedules, and it costs quite a bit less than most in this category. If you need to share files across a network, you'll want to pass on this one. But for your personal needs, Sidekick should serve as a trusty companion.—*WK*
Sidekick 97. Street price: \$50. Requires: 486-based PC or better, 8MB RAM, 12MB hard disk space, Windows 95 or Windows NT 4.0. Starfish Software Inc., Scotts Valley, CA; 888-782-7347, 408-461-5800; fax, 408-461-5900; www.starfish.com. Circle 448 on reader service card.

ISBISTER INTERNATIONAL INC.

Time & Chaos 32 5.2

Although Time & Chaos 32 5.2 doesn't match the power or quantity of features found in information managers like ECCO Pro or Outlook, it's relatively inexpensive (\$45 direct), it's a breeze to learn, and it provides the bulk of the features most individuals typically use. This 32-bit shareware program from Isbister

International also provides a modest level of workgroup support. Nevertheless, it lacks the thorough scheduling found in Sidekick and the extensive history found in Day-Timer.

During our testing, Time & Chaos imported only some of the last names from our test database because of a bug in the program. Isbister has since released a patch (Version 5.2.8) that fixes this problem, according to the company.

Once we managed to get our data into Time & Chaos, we found it to be a relatively intuitive program. Its default window displays all information types at once, including lists of contacts, details about them (such as phone numbers and e-mail addresses), the current day's appointments, and to-do items. The weekly and monthly calendar views use the entire screen space.

You conveniently create new items by dragging information from one part of the default window to another. You can also create new items or edit existing records by clicking on a blank space in the relevant area. Time & Chaos will dial a contact's phone number and launch a MAPI front end to send an e-mail message. You send a fax by clicking on the appropriate number.

Workgroup support isn't a strong suit, but Time & Chaos does perform some useful tasks. When planning meetings, you view the schedules of all workgroup members. Time & Chaos doesn't automatically find free time for all invitees or resolve scheduling conflicts, but it does display an on-screen warning when conflicts occur.

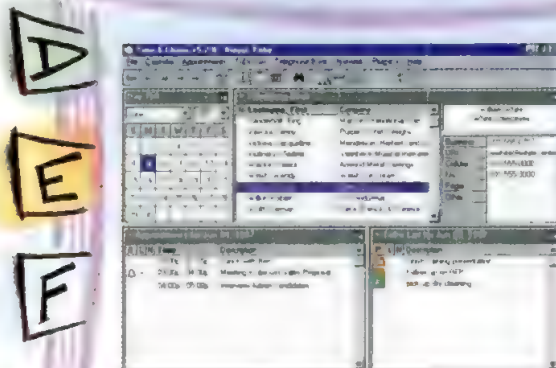
After creating an appointment or a task that you want to assign to a workgroup member, you drag it to the individual's icon. The program sends the item to your colleague via an internal store-and-forward mechanism. The recipient can

place the item in a personal calendar or to-do list, but Time & Chaos has no method for accepting or declining either meeting invitations or delegated tasks automatically.

Multiple workgroup members can view a single contact record at once, and everyone can edit the record at the same time. But Time & Chaos saves only the most recently changed version of the record and provides no on-screen warning about potentially conflicting versions.

Time & Chaos prints information in its own formats and in two Day-Timer formats. No Internet features come with the program, although a free add-on called Web Publisher lets you generate static calendars in HTML. For file synchronization capabilities, you must purchase TimeSync32 (\$19.95 list), which will update both your home database and your traveling one with the most recently changed records. You can also set it to update only specific parts of the database.

If you need to track group projects and the comings and goings of workgroup members, you should definitely look elsewhere. Otherwise, Time & Chaos 32 5.2's concise, easy-to-learn interface and low price make it a good alternative for individuals with limited budgets and basic in-



Time & Chaos places all the essential information into a single default dialog box.

formation management needs.—*DH* □

Time & Chaos 32 5.2. Direct price: \$45. Requires: 486-based PC or better, 16MB RAM, 3MB hard disk space, Microsoft Windows 95 or later or Windows NT 3.51 or later. Isbister International Inc., Garland, TX; 972-495-6724; fax, 972-530-6566; www.isbister.com. Circle 449 on reader service card.

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DATA AND VIDEO IMAGE QUALITY

These projectors accept input from a laptop or desktop PC and also accept standard video input from a VCR, TV, or TV camera. The quality of images at the units' native SVGA (800-by-600) resolution is generally good. Most can interpolate and display VGA (640-by-480) and XGA (1,024-by-768), though image quality suffers.

PORTABILITY

Portable-class products range from 10 to 30 pounds and can fit in an airplane's overhead bin. Here we focus on the sub-16-pound projectors intended for frequent use on the road.

BRIGHTNESS

All of the projectors here are bright enough to use in a standard-size conference room with the lights on. Brighter projectors can be used in a large lit room without having the images look washed out.

SOUND QUALITY

All have built-in speakers adequate for a small room, though tonal quality varies widely. For larger spaces, you'll need to connect powered external speakers.

For making presentations on the road or around the office, a self-contained projector can't be beat. We test 13 of the most portable and versatile.

By Alfred Poon

PORTABLE PROJECTORS

The portable projector is transforming the way businesses hold meetings. Instead of fuzzy overhead transparencies, expensive 35-mm slides, or flip charts that participants have to cluster around, today's road warrior needs only a laptop and a projector to present PC-based data or multimedia video.

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Visit the interactive version of "Portable Projectors: Lighter and Brighter" at the PC Magazine Web site

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The early data and video projectors were bulky, noisy, and not bright enough to be used under typical room-lighting conditions. The latest generation shows enormous improvement: light enough to carry and bright enough to see without dimming the lights. Prices have been easing down as well; you now have a choice of models with list prices under \$6,000.

Electronic projection products fall roughly into four categories. *Light-valve projectors* weigh hundreds of pounds and produce huge, bright images for auditoriums, theaters, and the like. These specialty devices, from makers such as Barco and Hughes/JVC, cost from \$25,000 to \$250,000 and produce images as wide as 40 feet. Smaller *three-beam projectors* (\$15,000 to \$25,000 list) employ technology similar to that of projection televisions and are meant for large meeting rooms.

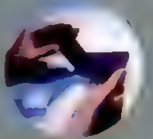
Such units are impractical for a typical business meeting, so professionals turned to *LCD panels*, which sit atop traditional overhead projectors. This type of unit requires that your meeting site have a bright overhead projector, however, and even then the image tends to be dim.

So a growing number of mobile professionals are turning to *LCD* (and the newer *DLP*) *projectors*, each of which combines the optics and light source in a self-contained, 10- to 30-pound package. Their images (as little as 2 feet or as large as 20 feet, measured diagonally) are suitable for presentations and training in a typical conference room. These units can be moved from room to room or taken on the

The story of a PC Card that's really a digital camera.



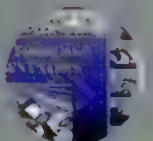
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But the PDR-2 isn't only for

notebooks. An optional SmartMedia floppy disk adapter makes it just as easy to use with your desktop. Plus, it's compatible with PC and Mac. But the crux of the story is its price—a mere **\$499**. And that includes Image Expert™ software for bringing up the image "filmstrip" for quick read and drag-and-drop, as well as LivePix™ image enhancement software which comes complete with templates for making cards, calendars, posters, and more. To learn more, visit our Web site at www.toshiba.com/cab1.htm or call us at 1-800-288-1354 xCAB1. We'll give you the full story, unabridged.

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road; most fit in an airliner's overhead bin, and the more compact units can be stowed beneath the seat in front of you.

REVIEW CRITERIA

The focus here is the lighter half of the LCD projector arena: units that weigh 16 pounds or less (without cables or case). Since most notebook PCs produce at least 800-by-600-resolution images through their external graphics adapters, we also required that each projector have an SVGA native resolution (we also tested the ability to handle 640-by-480 and 1,024-by-768 images).

We found 11 projectors that fit the filter for this feature, ranging in weight from under 10 pounds (the CTX Opto EzPro 550, Lightware VP800, and Telex Firefly P250) up to 16 pounds (the Eiki LC-7000, NEC MultiSync MT800, and Sharp Note-Vision XG-NV1U), with list prices from under \$6,000 (the Proxima Lightbook LB20 and Telex FireFly) to \$9,800 (the ASK LCD Impression A4). Models from Mitsubishi, Sony, and Toshiba would have fit our criteria but were not ready in time for testing.

What do you gain if you're willing to carry a heavier projector? We included a pair of larger models for comparison: the 27.7-pound Proxima Desktop Projector 4200z and the 24.4-pound Toshiba MediaStar TLP-411U, which adds a built-in color camera so you can use it to project printouts or three-dimensional objects.

CHOOSING A PROJECTOR

One of the fundamental differences among projectors is how the image is produced. Four of the models in this roundup use a single active-matrix LCD panel as the image source. Such devices are relatively inexpensive to create, weigh less, and, because the image comes from a single surface, have no *convergence* problems (where the red, green, and blue image elements might be misaligned, causing color halos around objects).

Another approach is the use of polysilicon liquid crystal panels (eight units here), which makes it possible to create high-resolution panels directly on quartz substrates (as opposed to the glass panels

Editors' Choice

• Epson PowerLite 5000



There are several good choices among the 13 projectors we

looked at, and the Epson PowerLite 5000 (\$9,399 list) stands out from the rest and is our Editors' Choice. The three-panel polysilicon LCD projector was the brightest we tested (407 ANSI lumens, versus 343 for the nearest competitor), and it produced crisp, clean 800-by-600 images with well-saturated colors even under normal room-lighting conditions. The unit also interpolated 640-by-480 and 1,024-by-768 images efficiently. Its compact design and 14.1-pound weight make the PowerLite easy to tote, and Epson has included a host of inputs.

Three other projectors performed admirably and merit honorable mention.

used for the standard active-matrix LCDs). Most poly-si designs use three separate panels (for the red, green, and blue images) and a series of lenses, prisms, and mirrors to merge the three on the screen. This results in a bright image, but some units may have convergence problems.

A competitor to LCD designs is *Digital Light Processing* (DLP) technology, developed by Texas Instruments and employed by several projector manufacturers. DLP units contain small panels covered with tiny mirrors that deflect light toward or away from the system optics. Lower-cost models typically are designed with a single panel; a spinning wheel puts color filters between the projector lamp and the panel, so that the red, green, and blue images are projected in rapid succession. Your brain combines the images to create a full-color picture (the process is called *field-sequential illumination*).

ASK LCD's Impression A4 (\$9,750 list) was the third-brightest on our tests (342 ANSI lumens) and, at 11 pounds, also one of the lightest. It includes a bevy of features, such as keystone adjustment, a lighted remote, a soft-side carrying case, and two computer inputs. The Boxlight 3700 (\$9,199 list) and the In Focus LitePro 720 (\$9,199 list) were equally bright and, at 12 pounds, just as portable. We especially like the CableWizard feature (called the CablePro on the Boxlight 3700), which takes the guesswork out of connecting PC or Mac portables.

Finally, two products are worth a look for those with more particular needs. If

portability is your utmost concern, look to the Lightware VP800 (\$6,495 list). It delivers acceptable image quality in a collapsible, 9.3-pound package. And if versatility is more important than portability, consider the Toshiba MediaStar TLP-



411U (\$8,995 list). This 24-pounder's unique built-in camera (on a raised arm) lets you project printouts and other objects, besides having the standard PC and video projection capabilities.

Right now, DLP designs are still too bulky for truly portable-class projectors, and our testing revealed that the DLP-based Proxima DP4200z was outperformed by most of the LCD designs.

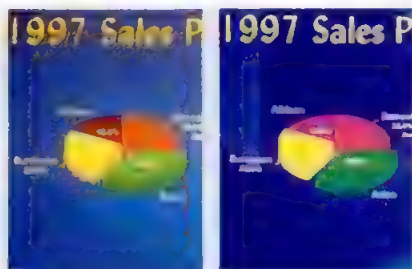
IMAGE BRIGHTNESS AND QUALITY

The bottom line for all these designs, however, is how much light reaches the screen. This is typically reported in terms of *ANSI lumens*, which measure both the amount of light falling on the screen and the size of the image. The projectors are rated for 200 to 500 ANSI lumens, though on our tests, none managed to equal their manufacturers' specifications.

In a side-by-side comparison of the brightest and dimmest units of the group, we discovered that even the weakest (the DP4200z and the FireFly) were capable of projecting legible black-and-white images (such as an Excel spreadsheet) under normal room-lighting conditions. Color images (a PowerPoint slide or video clip) from the lesser units tended to wash out, however. Only the brighter models—most notably the Impression, the In Focus

Our Contributors: ALFRED POOR and WINN L. ROSCH are contributing editors of *PC Magazine*. DENIS TOM is a freelance writer. JAMIE M. BSALES was the editor in charge of this story, and JEFF MACE was the project leader.

LCD Projectors: Details Make the Difference



◀ Some Dim, Some Bright

Projectors like the Proxima Lightbook LB20 produced dim images (left) that looked washed out in a normally lit room. Better models, such as the Epson PowerLite 5000, produced images bright enough to deliver good-looking presentations with the lights on.

Full-Featured Control ▶

A well-designed remote control can make or break a presentation. Most add mouse functionality to the basic projector controls; some sport a left-mouse button trigger, include a pointer feature for making screen annotations, or have illuminated buttons.

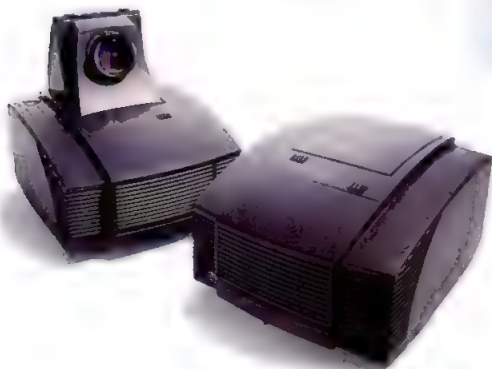


◀ Jacks Galore

For versatility, the PowerLite can't be beat. It includes two computer jacks (to connect either PC or Mac, indiscriminately), a video jack (to input S-Video or composite), and a jack to hook up an external monitor.

Cable Wizardry ▶

The In Focus LitePro 720 and Boxlight 3700 let you connect your computer audio, video, monitor, and mouse to a disklike hub powered by a microprocessor, which then connects to the projector by a retractable 10-foot cable. A turn of the dial reveals the different connectors for PC or Mac, which eliminates guesswork.



◀ Design Magic

Now you see it, now you don't. The CTX Opto EZPro 550 and LightWare VP800 share a clever collapsible design that folds to just 6.4 inches high, making them as easy to tote as notebook PCs.

LitePro 720, and the Epson PowerLite 5000 (our Editors' Choice)—were capable of projecting truly saturated colors under normal room-lighting conditions.

Closely related to the question of brightness is the issue of the projector bulb. The models in this roundup each use one of two designs: metal halide or halogen. *Metal halide* bulbs are typically rated for about 400 hours of useful life (though some new designs are now rated for 2,000 hours), but they can cost \$250 or more apiece. The useful life is based on how long it takes until the bulb loses half of its light output; the biggest drop in light output occurs during the first 100 hours or so, and the bulb's output then drops more gradually for the rest of its useful life.

The *halogen* bulbs have a much shorter life span—typically 50 hours or so—but they cost only \$10 to \$25 each. They are readily available from office-supply stores. The cost per hour for the two types of bulbs is roughly the same, but there are other considerations to keep in mind. If you intend to use the projector in one place most of the time, a metal halide bulb will require less maintenance. On the other hand, if you're traveling, a damaged metal halide bulb will be more expensive to replace than a halogen type, and it may be much more difficult to locate quickly.

Though the native resolution of the projectors is 800-by-600 (also called *SVGA*), they can handle signals in other resolutions. All of them will display a 640-by-480 VGA image, and all but three will scale down an XGA 1,024-by-768 signal. Such multiple-resolution capabilities are handy, but image quality suffers. Scaling up a VGA signal can create unwanted artifacts on-screen, and scaling down an XGA signal can cause problems for small text and other detailed images.

EASE OF USE

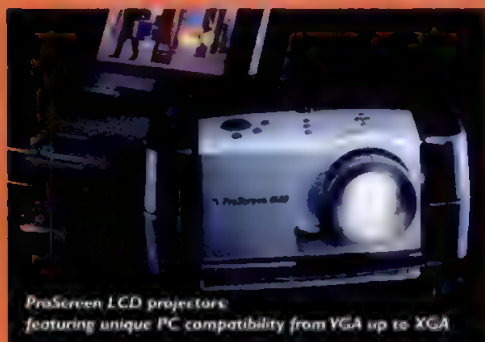
All these projectors have plenty of inputs for computer and video sources, and most have outputs as well. But some go beyond the minimum, with handy features such as a microphone input or a pass-through so you can use your computer's mouse as well as any remote mouse feature.

The remote controls also are worth a close look. All but three we tested can

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Portable Projectors

both control a projector's functions and act as remote pointers for your PC, giving you access to all your PC's mouse functions so you can run your presentation and not touch your PC. Five of the remotes we tested include lighted buttons as well.

The image controls are also important. Most projectors have both brightness and contrast controls, but some less expensive models may offer only one or the other. The projector should also have a phase or timing adjustment to reduce or eliminate the jitter you get with some images. Also look for a unit with a *keystone adjustment*, which lets you square an image if you need to place the projector close to the screen.

All the projectors come with built-in speakers and amplifiers to let you play multimedia clips or to provide audio background for your presentations. Some even have microphone jacks so you can amplify your voice through the same system. The projectors we tested have a wide range of abilities, however. Most have separate left and right stereo channels. Some have larger speakers and more powerful amplifiers that can fill a room without sounding like the dashboard radio on a '57 Ford, while others are better suited to smaller groups at lower volumes. For the best quality, you'll want to add a set of powered speakers to your road case; each model has its own stereo output jack.

SUPPORT AND WARRANTY

The final set of factors to consider are warranty and support issues. All the projectors come with at least a one-year parts-and-labor warranty, but if you're on the road and counting on the projector for presentations, you may want something faster than just returning the projector to the manufacturer for repair. Four manufacturers have hot-swap policies that will get you a working replacement overnight, which could be a deal saver. Others don't have any official policy for this but work with their resellers to provide such services when they can. If this is important to you, be sure to discuss it in detail with the dealer from whom you're buying the projector to find out just how far the dealer is willing to go to help you out of a jam.

The other question to consider is that of image defects. These projectors use some form of active-matrix panel, and it is possible that one or more of the thousands of transistors on the panel may not function correctly. This can result in a pixel that is permanently on or off. You might think that paying nearly \$10,000 for a projector would entitle you to a flawless display, but you'd be mistaken. The current state of the art for active-matrix panel production does not yet yield perfect panels 100 percent of the time. If manufacturers were to specify panels with no defects, the cost per panel would soar. As it stands, you can expect to get a few stuck pixels—either on or off—which will result in bright or dark dots on the screen. The policy on replacements varies among manufacturers, so you may want to check on the number of defects they deem acceptable before you buy.

These projectors all represent significant investments. But they'll let you take your show on the road. And you'll even be able to keep the room lights turned on, which should help keep your audience from having an after-lunch nap.

ASK LCD Impression A4

REVIEWS BY ALFRED POOR, WINN L. ROSCH, AND DENIS TOM

The Impression A4 (\$9,750 list), from ASK LCD, was one of the brightest units we tested. That, together with a strong feature set, should put this 11-pound, three-panel polysilicon projector on your short list.

Setup was straightforward. As with most of the units reviewed here, zoom and focus are manual. Unlike other units, the Impression includes



ASK LCD Impression A4	
Portability	Good
Brightness	Excellent
Data image quality	Good
Video image quality	Good
Sound quality	Good



Boxlight 3700	
Portability	Good
Brightness	Excellent
Data image quality	Excellent
Video image quality	Good
Sound quality	Fair

keystone adjustment, a lighted remote, and a soft carrying case. It supports two computer inputs and every popular video standard. We did have more difficulty controlling cursor movement with the Impression's infrared mouse, although a dual cable lets you attach a standard tethered mouse.

The Impression put out 342 ANSI lumens, making it the third-brightest unit we tested, and its score on our White/Black Contrast test was second from the top. Brightness uniformity was also good, as was convergence—even with the three-panel design. The unit can handle resolutions from 640-by-480 up to an interpolated 1,024-by-768 (actually, the less common 1,152-by-870).

ASK LCD offers an average 48-hour turnaround for repairs and is considering an overnight-exchange option. The Impression does a good job with a useful mix of features, making it a worthy choice.

Boxlight 3700

Delivering superior performance in a lightweight package at a reasonable price, the 12-pound Boxlight 3700 (\$9,199 list, \$7,300 street), from Boxlight Corp., is an impressive projector. Like the In Focus LitePro 720 we also tested (In Focus Systems manufactures the Boxlight 3700 to Boxlight's specifications), this three-panel polysilicon unit recorded brightness (330 ANSI lumens) and contrast levels in the top tier. With the exception of slight green and red shifts on the corners of the projected display, the unit produced evenly illuminated images. Colors were vivid and well saturated in diffused lighting.

The Boxlight 3700 includes both a wireless remote and a 50-foot cable that

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Portable Projectors

lets you tether it to the projector—handy if you want to place the projector in the rear of the room, out of infrared-sensor range. It has a two-button mouse and a pointer function to annotate what's on the screen. Setup for the projector was accommodating. The audio, mouse, and monitor cables attach to a main cable called the CablePro (In Focus calls this the CableWizard); graphical on-screen menus are easy to use and feature configuration buttons that speed up the process considerably.

Other extra features include a manual zoom lens, keystone adjustment, and a next-business-day warranty exchange program. The single 3-watt speaker, however, may prove inadequate for larger rooms. The Boxlight 3700 merits serious attention from anyone looking to deliver powerful presentations on the road.

CTX Opto EzPro 550

The EzPro 550 (\$6,495 list), from CTX Opto, looks a lot like the Lightware VP800, which we also tested for this roundup. CTX manufactures both of these single-panel, active-matrix LCD projectors. Although the 9.3-pound EzPro has some flaws, this is one of the more affordable units we looked at. It's a good choice if portability matters most.

The EzPro comes in a hard case that provides excellent protection and a convenient place to keep cables and accessories. The cleverly designed unit collapses to just 6.4 inches high, making it one of the most portable projectors around. The EzPro includes an effective mechanical keystone

CTX Opto EzPro 550	
Portability	Excellent
Brightness	Good
Data image quality	Fair
Video image quality	Fair
Sound quality	Fair



Eiki LC-7000	
Portability	Good
Brightness	Good
Data image quality	Excellent
Video image quality	Good
Sound quality	Fair

adjustment and an infrared remote but no zoom lens.

Image quality was adequate—but not without defects. The EzPro was

bright enough for most uses (245 ANSI lumens), with better-than-average contrast. Brightness uniformity was poor, however, and the focus was off for the right-hand portion of the image, with visible halo effects. Color fidelity was also poor, with magenta verging on pink and yellow verging on orange. Though the volume from the two 3-watt speakers isn't very loud, the cooling fan makes only a purr.

The CTX Opto repair policy provides an exchange unit within two to three business days. The image quality is not on a par with some of the other units, but the low cost, light weight, and hard case are sure to find a following among road warriors.

Eiki LC-7000

California-based Eiki International started making projectors 50 years ago for the movie industry. The 16-pound, three-panel polysilicon LC-7000 (\$8,995 list) marks the company's first projector for the corporate big screen. Though the LC-7000 isn't the brightest projector we tested, its unique design features make it worth a look.

The projector's retractable handle makes it eminently portable. Setup posed no problems. The mouse function on the remote is controlled through a trigger-style left button, and there are infrared sensors on both the front and back of the projector, making the remote easy to use from anywhere in the room. The unit features a power zoom lens (one of only three in this roundup) as well as keystone adjustment.

The LC-7000 projects SVGA images and reduces VGA images by default, although the control system lets you scale up for a larger display. Performance was in the midrange. The projector produced bright, clear images at 279 ANSI lumens. Some still images exhibited pincushioning (the sides of the image bowed in), and the menu settings didn't let us remove some sync artifacts (vague vertical bars) that were present. If design features and versatility mean more to you than flawless image quality, this product is a good fit.

Epson PowerLite 5000



Epson America's PowerLite 5000 (\$9,399 list) delivers the best combination of brightness, features, image quality, and portability in this roundup, winning the Editors' Choice award. The compact, 14.1-pound, three-panel polysilicon unit produced uniformly sharp image quality with excellent convergence, and it was easily the brightest projector we test-



Epson PowerLite 5000	
Portability	Good
Brightness	Excellent
Data image quality	Excellent
Video image quality	Good
Sound quality	Good

ed: 407 ANSI lumens, versus 245 ANSI lumens nearest competitor.

The manual makes it easy. Focus and zoom are controlled

manually, using concentric rings on the projection lens, though the keystone adjustment. Epson has two computer inputs, two video inputs, and a quick-exchange, two-year warranty.

At its native 800-by-600 resolution, PowerLite's image quality is the best. Epson claims that its technology, called SizeWise, displays 1,024-by-768 images interpolated to match the 800-by-600 resolution step ahead of the line drop method manufacturers use, though

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SUMMARY OF FEATURES

Portable LCD Projectors

PC MAGAZINE
... CHOICE
EDITORS' CHOICE

■ YES ■ NO □ OPTIONAL

Products listed in review order

	ASK LCD Impression A4	Boxlight 3700	CTX Opto EzPro 550	Eiki LC-7000	Epson PowerLite 5000	In Focus LitePro 720	Lightware VP800
List/street price	\$9,750, N/A	\$9,199, \$7,300	\$6,495, N/A	\$8,995, N/A	\$9,399, N/A	\$9,199, \$7,360	\$6,495, N/A
Dimensions (HWD, in inches)	5.4 x 9.8 x 11.8	6.0 x 11.7 x 15.3	6.4 x 10.2 x 12.5	5.8 x 11.5 x 17.9	8.3 x 9.7 x 15.3	6.0 x 11.7 x 15.0	6.4 x 10.2 x 12.5
Weight (pounds)	11.0	12.0	9.3	16.0	14.1	12.0	9.3
Carrying case	Soft, included	Soft, \$89; hard, \$449	Deluxe, included; soft, \$139	Wheeled, \$100	Soft, \$99; wheeled, \$240	Soft, \$100; hard, \$299	Hard, included; soft, \$100
Imaging technology	3-panel poly-silicon LCD	3-panel poly-silicon LCD	1-panel amorphous LCD	3-panel poly-silicon LCD	3-panel poly-silicon LCD	3-panel poly-silicon LCD	1-panel amorphous LCD
Actual resolution	800 x 600	800 x 600	800 x 600	832 x 624	800 x 600	800 x 600	800 x 600
Highest interpolated resolution	1,152 x 870	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	1,024 x 768	800 x 600
Lamp type/Rated lumens	Metal halide/500	Metal halide/450	Halogen/270	Metal halide/500	Metal halide/450	Metal halide/450	Halogen/270
Rated hours/Replacement cost	2,500, \$400	2,000, \$495	70, \$20	1,000, \$310	2,000, \$499	2,000, \$495	70, \$20
Rated distance to screen	3-32 feet	5-18 feet	3-13 feet	4-78 feet	4-34 feet	5-40 feet	5-24 feet
Rated diagonal image size	1.9-25 feet	3-14 feet	5-20 feet	1.3-43 feet	2-25 feet	3-31 feet	5-20 feet
Freeze frame/Keystone adjustment	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Electronic zoom	■	■	■	■	■	■	■
Zoom lens	Manual	Manual	None	Power	Manual	Manual	None
Number of speakers/watts per channel	4, 1W	1, 3W	2, 2W	2, 2W	2, 2W	1, 3W	2, 3W
Number of computer inputs	2	1	1	1	2	1	1
Video standards supported:							
NTSC/NTSC 4.43/SECAM	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
PAL/PAL-M/PAL-N	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Remote can control PC mouse functions	■	■	■	■	■	■	■
Lighted keypad on unit/on remote	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Drives external monitor simultaneously	■	■	■	■	■	■	■
Warranty (parts and labor)	1 year	1 year	1 year	3 years	2 years	1 year	1 year
Quick-exchange program under warranty	■	■	■	■	■	■	■
Toll-free tech-support hours (eastern time)	8:30-7:00 M-F	9:00-8:00 M-F	11:00-8:00 M-F	9:30-6:00 M-F	9:00-9:00 M-F	24 hours, 7 days	10:00-8:00 M-F
Web address	www.ask.no	www.boxlight.com	www.ctxopto.com	www.eiki.ca	www.epson.com	www.infocus.com	www.lightware.com

N/A—Not applicable: The vendor does not cite a street price.

a noticeable improvement over similarly priced projectors. Still, if you need a projector that delivers it all, the PowerLite 5000 is the right choice.

In Focus LitePro 720

The LitePro 720 (\$9,199 list, \$7,360 street), from In Focus, takes to the road like Jack Kerouac. Light (12 pounds), stylishly curved, and compact, this three-panel active-matrix projector sets up quickly and delivers top performance.

The LitePro is equipped with innovative details. Its CableWizard adds 10 feet of extension cabling to the projector, letting you set up both the projector and your laptop in the most convenient locations. Even better, the rotating dial lets you switch connectors from PC to Mac, and the icons make hooking up almost idiot-proof. Focus and zoom are mechanically controlled by separate rings around the projection lens, and each ring is coded with dots and grooves for easy

identification in the dark. All keypads are illuminated. Two mouse buttons on the remote give a reassuring click when pressed, though they occasionally stuck during use. A pointer function lets you make on-screen annotations.

Like the Boxlight 3700, the LitePro performed well on our tests. It produced a top-tier 343 ANSI lumens and the best brightness uniformity score of

In Focus LitePro 720	
Portability	Good
Brightness	Excellent
Data image quality	Excellent
Video image quality	Good
Sound quality	Fair



the group. But the single 3-watt speaker left us wanting a better sound system. All in all, the LitePro is a fine contender. And potential buyers should note: In Focus has begun offering a companion product, the Presentation Player (\$1,799 list), which wasn't complete in time for this roundup. The 6-pound player contains a Zip drive and a 1.2GB hard disk, and it connects to the projector, which lets you leave your laptop in your hotel room and still have everything you need to deliver your presentation.

Lightware VP800

The Lightware VP800 (\$6,495 list) is a standout. This 9.3-pound, single-panel active-matrix projector has a clever set of folding optics that make it one of the smallest and lightest projectors we tested. It also has some performance advantages over its manufacturing cousin—the CTX Opto EzPro 550—that may give it the edge.

As with the EzPro, setup was easy,

Portable Projectors

NEC MultiSync MT900	Proxima Lightbook LB20	Proxima Desktop Projector 4200z	Sharp NoteVision XG-NV1U	Telex Firefly P250	Toshiba MediaStar TLP-411U
\$7,495, N/A	\$5,999, \$5,000	\$6,659, \$5,000	\$7,995, N/A	\$5,995, N/A	\$8,995, \$7,800
5.9 x 12.7 x 18.0	4.9 x 9.4 x 13.5	7.9 x 19.0 x 18.8	4.7 x 10.4 x 15.3	2.7 x 10.3 x 15.8	6.7 x 12.6 x 17.9
18.0	11.3	27.7	16.5	9.8	24.4
Soft, \$198; hard, \$299	Soft, included; hard, \$279	Soft, \$369; hard, \$449	Soft, \$79; hard, \$175	Soft, included	Soft, \$195
3-panel poly-silicon LCD	1-panel amorphous LCD	Digital light processing	3-panel poly-silicon LCD	1-panel amorphous LCD	3-panel poly-silicon LCD
800 x 600	800 x 800	800 x 800	832 x 624	800 x 600	800 x 600
1,024 x 768	800 x 600	1,024 x 768	1,024 x 768	800 x 600	1,024 x 768
Metal halide/250	Halogen/200	Metal halide/270	Metal halide/400	Halogen/220	Metal halide/500
2,000, \$350	50, \$20	350, \$269	2,000, \$318	80, \$20	2,000, \$495
3-40 feet	4-14 feet	5-30 feet	5-56 feet	3-19 feet	3-35 feet
1.6-25 feet	4-14 feet	3-26 feet	3-25 feet	3-19 feet	2-20 feet
					
					
Power	None	Power	Manual	None	Manual
2, 3W	2, 1W	2, 3W	2, 3W	2, 3W	1, 1.15W
2	1	2	1	1	1
					
					
					
					
					
					
2 years	1 year	1 year	3 years	1 year	1 year
					
8:00 A.M.-8:30 P.M. M-F	9:00-9:00 M-F	9:00-9:00 M-F	9:00-6:00 M-F	8:00-8:00 M-F	7:00-7:00 M-F
www.nec.com	www.proxima.com	www.proxima.com	www.sharp-usa.com	www.telex.com	www.toshiba.com/tacp



Portability	Excellent
Brightness	Good
Data quality	Excellent
Video quality	Good
Sound quality	Excellent

thanks to well-labeled connectors, a full complement of cables, and on-screen configuration menus. The manual keystone

adjustment helps you to square the image on your screen, though the projector's single-leg design (with no side-to-side adjustments) makes setting the precise height awkward.

The VP800 we tested was not as bright as the EzPro (219 ANSI lumens versus 245), but its score on our White/Black Contrast test was very good. Like the EzPro, the VP800 exhibited uneven brightness, poor color fidelity, and halo effects. Nevertheless, the VP800 displayed a more sharply focused image. Sound level was adequate, although tone control was limited and audio from the speakers was thin.

When Lightware introduced this unit a year ago, it was half the weight of other portable projectors and was a clear winner. Other vendors have caught up, however, and now deliver brighter images in packages weighing just a few pounds more. Still, the VP800's compact design and affordability keep it a respectable choice for hard-core road warriors.

NEC MultiSync MT800

From packaging and documentation to setup and performance, the three-panel, 16-pound polysilicon MultiSync MT800

(\$7,495 list), from NEC Technologies, left us wanting more from this big-name competitor.

Documentation consists of a video-cassette instead of quick-start instructions. The wireless remote does not have a lighted keypad and is so big that it might require two hands to use. The projector skimps on buttons and confusingly combines functions. On the upside, the Multi-Sync boasts a unique 2x/4x electronic zoom, a power zoom lens, and a separate IR receiver that plugs into the mouse port



(so you can position the receiver where you need it).

The MultiSync placed midpack in brightness on our test (241 ANSI lumens), and image quality at 800-by-600 resolution was beyond reproach. The unit failed to produce a stable interpolated 1,024-by-768 image at 72 Hz, however; we had to slow the refresh to 60 Hz. Video quality proved good, though audio control and sound quality were weak. Other projectors here proved more user-friendly for the money.

Proxima Lightbook LB20

At just 11.3 pounds and \$5,000 (street), Proxima Corp.'s Lightbook LB20 is one of the lightest and least expensive units we tested. But performance proved below average, diminishing its appeal.

The projector unfolds upward like a puzzle box and includes a soft carrying case (there are no extra compartments for accessories, however). There are also no height-adjustment legs or zoom controls, and the manual focus control was difficult to reach. On the upside, the manual keystone adjustment feature was fine. The pair of infrared remotes also worked well, without conflict with a regular mouse.

BENCHMARK TESTS

Portable LCD Projectors



This field of lightweight projectors makes one thing clear: You can take great presentations on the road using just a laptop and one of these devices. Though each of the projectors produced enough light to be usable under most conditions, four models were the best and brightest.

What the Numbers Mean

There are a number of factors to consider when comparing LCD projectors. Aside from feature set and ease of use, qualitative factors such as focus, image quality, and color fidelity are key differentiators—as are quantitative factors such as brightness, brightness uniformity, and contrast ratio. Brightness and contrast specifications are often touted by the manufacturer as selling points; our testing revealed, however, that these ratings tend to be overly optimistic.

The **Average Brightness** test measures the amount of light produced by the unit that actually reaches the screen as an image. The clear standout among the products tested was Epson America's PowerLite 5000, which emitted nearly 20 percent more light than the runner-up, In Focus Systems' LitePro 720. All the models we tested produced visible images under normal indoor lighting conditions, but for projecting vibrant color images in diffused lighting, consider one of the four units that produced more than

300 ANSI lumens—the PowerLite, the LitePro, ASK LCD's Impression A4, or the Boxlight 3700.

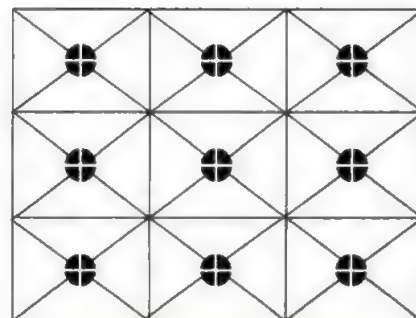
The **Brightness Variance** test measures how evenly the projector illuminates the screen. Flaws in the optics or the light source (either a metal halide or halogen bulb) may cause noticeable light and dark areas. A perfect score of 1.0 means there is no variation in brightness between the lightest and darkest parts of the image. The Boxlight 3700, PowerLite, and LitePro were top scorers at 1.2, though models that scored below 1.5—the Impression, the Sharp NoteVision XG-NV1U, and the Toshiba MediaStar TLP-411U—have excellent brightness uniformity. The units that scored over 2.0—such as the Telex Firefly P250, the CTX Opto EzPro 550, and the Promixa Desktop Projector 4200z—were the lightest models.

The **White/Black Contrast** test compares the light levels on white and black parts of a screen image. A higher contrast ratio means a higher differentiation

between dark and light areas, which in turn yields sharper, easier-to-view images. Proxima's Lightbook LB20 turned in the best contrast ratio, at 67.2, and more than half the units we tested had excellent contrast ratios—above 60.—
Analysis written by Alfred Poor

How We Tested

The standard measurement for projector brightness is set by the American Nation-



Our test image consisted of a standard nine-point ANSI measuring grid. To calculate the Average Brightness score, we averaged the readings at these nine points, then multiplied the result by the image area (in square meters). For the Brightness Variance score, we divided the highest light-reading score of the nine points by the lowest.

al Standards Institute (ANSI) in document ANSI IT7.215-1992, "Data Projection Equipment and Large Screen Data Displays—Test Methods and Performance Characteristics." Given that most manufacturers report their projector brightness specifications in ANSI lumens, we followed the ANSI test methodology for our tests.

We tested each of the projectors at a resolution of 800 by 600 dots per inch. We set up each unit, adjusting image size and focus to fill our target area. The screen was 2 meters wide and 1.5 meters high, for a total screen area of 3 square meters.

Next, we adjusted the projector's brightness and contrast settings, using test images generated by DisplayMate for Windows, from Sonera Technologies (908-747-6886, www.sonera.com)—a New Jersey-based company that designs applications used in testing monitors

	Average Brightness Lumens	Brightness Variance Score	White/Black Contrast Ratio
Bold type denotes first place.			
ASK LCD Impression A4	342	1.3	66.9
Boxlight 3700	330	1.2	65.3
CTX Opto EzPro 550	245	2.1	60.6
Eiki LC-7000	279	1.6	52.0
Epson PowerLite 5000	407	1.2	81.2
In Focus LitePro 720	343	1.2	60.7
Lightware VP800	219	2.0	56.9
NEC MultiSync MT800	241	1.6	63.7
Proxima Lightbook LB20	148	1.9	67.2
Proxima Desktop Projector 4200z	155	2.1	55.4
Sharp NoteVision XG-NV1U	280	1.3	47.4
Telex Firefly P250	154	2.9	29.3
Toshiba MediaStar TLP-411U	263	1.4	51.0
	BETTER >	< BETTER	BETTER >

Portable Projectors

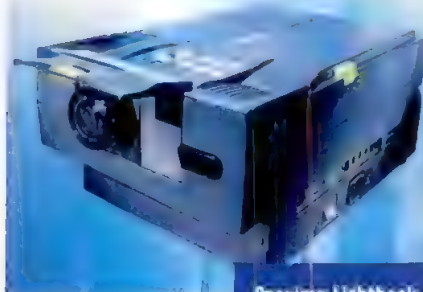
and display devices.

Once we adjusted the settings, we viewed the ANSI brightness/blanking image (also produced by DisplayMate) to check that they were correct. From this point on, we did not alter the brightness and contrast controls.

For the **Average Brightness and Brightness Variance** tests, we took light readings in a darkened room using a Tektronix J17 readout base with a J1811 light meter. We placed the target image on a full-white screen that contained the ANSI nine-point measuring grid. We then placed the measurement head on the target facing the projector and measured the light that fell on each of the nine points to the nearest 1/10 lux. To calculate the Brightness score, we averaged those nine light readings, then multiplied the number by the image area (in square meters). For the Brightness Variance score, we divided the highest of the nine readings by the lowest.

For the **White/Black Contrast** test, we used the Tektronix light meter with the ANSI contrast measurement pattern generated by DisplayMate. The image is a checkerboard pattern. It was designed to illustrate the impact on the image if light from the white portions scatters within the projector, raising the light levels of the black rectangles. We took a light measurement at the center of each rectangle; we then calculated an average for the white rectangles and an average for the black rectangles. In order to obtain the contrast ratio, we divided the average white value by the average black value.

We also performed a series of subjective tests. Using DisplayMate for Windows, we generated a wide range of test images to help us in evaluating a projector's ability to produce 256 shades per color channel, as well as bandwidth, convergence, and streaking, among other factors. We then ran the same tests at resolutions of 640-by-480 and 1,024-by-768, to check for possible artifacts created by scaling images up or down. To evaluate sound and video performance, we used a Hi-8 video deck with a pre-recorded tape containing a stereo sound track. Each unit supported both composite and S-Video connections, and we tested both.



Performance was mixed. Its score on our White/Black Contrast test was outstanding, but it produced just 148 ANSI lumens—the least in this roundup. Image quality was marred by halo effects and poor color fidelity: Magenta appeared pink, and cyan appeared almost turquoise. The projector displayed 640-by-480 images without scaling, but we noticed visual artifacts on images with fine gray patterns. You cannot display resolutions beyond its native 800-by-600. Sound volume and tonal quality were good.

On the whole, the Lightbook was disappointing. Even with this product's competitive price and light weight, other models present a more compelling buy.

Proxima Desktop Projector 4200z

Like Toshiba's MediaStar TLP-411U, the 27-pound Desktop Projector 4200z (\$6,659 list, \$5,000 street), from Proxima Corp., was included in our roundup for comparison. It uses Texas Instruments' DLP technology.

Documentation was thorough, and a wide range of cables was provided (including international power cables), which made installation easy. The pair of remote controls requires special software for remote mouse functions that coexist with the existing mouse.

DLP is a reflective technology that relies on tiny mirrors, so you might expect a brighter image than what you get from transmissive LCD designs. Unfortunately, the DP4200z managed to deliver only 155 ANSI lumens on our tests. When we set the projector for monochrome display (by disengaging the color wheel that places red, green, and blue filters in the light path), the bright-

ness jumped to 510 ANSI lumens—significantly brighter than any other unit we tested.

Image quality was excellent, though brightness uniformity and contrast were below average. The DLP pixels were much less visible than with LCD models, and colors were vivid and accurate. There was some horizontal streaking where black lines end in gray regions. The large cooling fan required by the DLP engine was also quite noisy. While the speakers have plenty of volume to combat this, the system lacks tone controls. DLP technology has its advantages, but the DP 4200z needs to be quieter, brighter, and lighter to compete in the portable projector market.

Sharp NoteVision XG-NV1U

Little things will endear Sharp Electronics' NoteVision XG-NV1U (\$7,995 list) to you, from the three-panel polysilicon projector's small footprint to the reasonable price and attention to details. Still, if brightness is the most important qualifier, the 16.5-pound NoteVision won't satisfy.

Setup was a breeze. The lens tucks inside the rectangular case, and tabs augment the mechanical focus and zoom adjustments on the lens barrel. The buttons are illuminated on both the unit and the wireless remote. The remote fits the

Proxima Desktop Projector 4200z	
Portability	Low
Brightness	Low
Data image quality	Low
Video image quality	Low
Sound quality	Low



hand well, with a left mouse-button trigger design. A pointer is built in, and an optional cable lets you connect by wire.

The NoteVision resized 640-by-480 images beautifully—video looked great, too—but the unit strained when scaling down 1,024-by-768 images. Audio quality was good, but because of the confines of the projector case, the sound lacked



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HARDWARE

Portable Projectors



**Sharp NoteVision
XG-NV1U**

Portability	Good
Brightness	Good
Data image quality	Excellent
Video image quality	Good
Sound quality	Good

wide stereo and bass. Colors proved pure and sharp, and brightness (280 ANSI lumens) fell in the midrange. Though it's a touch heavier than other units, the NoteVision's image quality and feature set make it worth consideration.

Telex Firefly P250

If you are looking for a lightweight, low-priced projector suited for travel and are willing to trade some features and performance to get it, consider Telex Communications' Firefly P250 (\$5,995 list). The active-matrix LCD unit was one of the least expensive of the bunch, and its 9.8-pound design collapses to 3 inches in height, leaving enough room left over to fit a notebook PC in the included carrying case.

The Firefly lacks a zoom feature and height adjustment controls. Image quality was sharp but dim and unevenly illumin-

nated, which landed the unit near the bottom on all our tests. It produced only 154 ANSI lu-

Telex Firefly P250	
Portability	Excellent
Brightness	Fair
Data image quality	Fair
Video image quality	Fair
Sound quality	Fair



mens, and bright spots were visible, resulting in the worst brightness uniformity score in this roundup. Its contrast was also below par. While this is bright enough to view an Excel spreadsheet in diffuse lighting, you'll want to view color presentations with the lights off. The Firefly is a good choice only for road warriors looking to do hit-and-run presentations.

Toshiba MediaStar TLP-411U

Tipping the scales at 24.4 pounds is the three-panel, polysilicon MediaStar TLP-411U (\$8,995 list, \$7,800 street). We've included it here to provide a comparison with lightweight models. The MediaStar, from Toshiba America Consumer Products, adds some attractive enhancements that may be tempting if features rank higher for you than ultimate portability.

Setup was fairly easy. It has manual zoom and focus, though no keystone correction. What makes the MediaStar a standout is its built-in video camera. The charge-coupled device (CCD) is contained in a lighted arm that rises from one side of the projector. When you place papers and three-dimensional objects in front of the camera, it projects the images onto the screen. The camera also has a handy zoom feature.

The MediaStar performed well on our tests, with good brightness (283 ANSI lu-



**Toshiba
MediaStar TLP-411U**

Portability	Fair
Brightness	Good
Data image quality	Good
Video image quality	Excellent
Sound quality	Good

mens) and solid brightness uniformity. Image quality, however, was marred by noticeable convergence errors. Horizontal streaking was also evident when midlevel gray areas appeared next to black or white regions. The projector displays 640-by-480 images (unscaled only); when we scaled 1,024-by-768 images to fit, it cropped the images on all sides. The video performance was superb (the best in this roundup), scaling to fill the image field, but the single 1.5-watt speaker had trouble overpowering the loud drone from the cooling fan.

Image quality was average, but the versatility of the video camera could be a deciding factor in the MediaStar's favor. It's a fairly good choice, especially if you don't intend to carry it far—or frequently. □

Contacting the Vendors

ASK LCD INC. Lyndhurst, NJ
800-275-5231, 201-896-8888
www.ask.no

BOXLIGHT CORP. Poulsbo, WA
800-762-5757, 360-779-5779
www.boxlight.com

CTX OPTO INC. Sunnyvale, CA
800-433-5590, 408-541-6060
www.ctxopto.com

EIKI INTERNATIONAL INC.
Lake Forest, CA
800-322-3454, 714-457-0200
www.eiki.ca

EPSON AMERICA INC. Torrance, CA
800-463-7766, 310-782-0770
www.epson.com

IN FOCUS SYSTEMS INC. Wilsonville, OR
800-294-6400, 503-685-8888
www.infocus.com

LIGHTWARE INC. Beaverton, OR
800-445-9396, 503-641-7873
www.lightware.com

NEC TECHNOLOGIES INC. Itasca, IL
800-632-4636, 630-775-7900
www.nec.com

PROXIMA CORP. San Diego, CA
800-447-7692, 619-457-5500
www.proxima.com

SHARP ELECTRONICS CORP. Mahwah, NJ
800-237-4277, 201-529-8200
www.sharp-usa.com

TELEX COMMUNICATIONS INC. Minneapolis, MN
800-828-6107, 612-884-4051
www.telex.com

TOSHIBA AMERICA CONSUMER PRODUCTS INC.
Wayne, NJ
800-346-6672, 201-628-8000
www.toshiba.com/tacp

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PC Computing, July 1997

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Matrox Rainbow Runner Studio

- Ideal for video editing, video conferencing, PC to TV output, PC-VCR video capture, and hardware MPEG video.
- Includes 4 free software titles. \$500 value.

matrox

1-800-471-8339 <http://www.matrox.com/mga>



* Estimated street price. All performance tests conducted by Matrox Graphics Inc. on a Gateway 200 MHz MMX with 32 MB of RAM and 512K cache. Matrox Mystique 220 Business, Diamond Stealth3D 2000XL, STB Nitro 3D, and ATI 3D ProTurbo + PC2TV were configured with maximum memory configurations using driver releases 3.41, 4.03.00.3105, 1.50K and 3.03 respectively. WinBench 97 business tests conducted at 1024 x 768 @16-bit at 75 Hz using small fonts under Windows 95. 3D WinBench 97 tests conducted at default resolution of 640x480 @16-bit at 75 Hz with Direct3D™ 3a using small fonts under Windows 95. 3D WinBench settings were dictated by Quality Suite responses for the respective products.

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think globally SURF LOCALLY

WEB REGIONAL GUIDES

*The Web comes
to your home-
town and your
favorite cities.*

By David Lidsky

AS MUCH AS THE WEB HAS EXPANDED OUR VISTAS OF KNOWLEDGE, IT HASN'T BEEN ABLE TO give us some good ideas for what to do on a Saturday night. Web regional guides fill that need, melding together yellow pages, arts and entertainment guides, newspapers, and road maps into searchable, interactive tools that can do everything paper media do, and more.

A Web regional guide can help you plan a weekend, a trip, or even a move with relative ease. If you want to see a movie tonight, you can find out what's playing at your favorite theater, consult the show times, and study the reviews before buying the tickets online. Then you can find a restaurant near the theater for dinner and an ice-cream parlor for dessert afterward. And if you aren't sure how to get somewhere, you can check out a map or request door-to-door directions.

These services don't exist just because they're neat. Billions of dollars are spent

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city-by-city coverage
and see which Web
regional guides are in
your town

WWW.PCMAG.COM

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on local advertising each year in the United States, and the companies moving into the regional guide market want a piece of the action. When telephone companies (Pacific Bell, U S West), big media (Cox Enterprises, *The Dallas Morning News*, Tribune Co.), search-engine companies (Excite, Lycos, Yahoo!), and computer industry giants (AOL, Microsoft) all enter a product category, you know there must be money in it. And with NBC and Time Warner on the way—probably by the time you read this—what was once the quiet province of a start-up named CitySearch is becoming awfully crowded.

CONTENT PROVIDERS VS. LINKSTERS

Web regional guides can be cast as either content providers or link aggregators. Content providers, such as CitySearch, Sidewalk, and Pacific Bell At Hand, assemble editorial staffs and produce their own reviews and listings for events in a city. Search-engine companies Excite, Lycos, and Yahoo! are the most prominent regional-guide link aggregators, serving up subsets of their databases for

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individual cities.

A content provider generally offers a more comprehensive, integrated look for a particular city, but its reach is limited, and it can suffer in quality outside its hometown. A link aggregator almost always sends you off to other sites for information. You're getting what you want, but you're missing out on the strong integration the content providers deliver, such as having basic data, a review, and a map all in one place. Link aggregators have the advantage of a much broader range than that of content providers, but the results often lack the local character that distinguishes our nation's cities.

The approach to information delivery varies wildly from service to service, as does the quality of the city sites within a service.

No single winning formula exists for Web regional guides, though we found that the best sites capture a strong local feel.

Resources limit most of these guides, especially the content providers, to just a few major cities. Pacific Bell At Hand covers only the state of California, for example. CitySearch and Sidewalk have aggressive plans to move into large and mid-size cities across the United States, but the rollout has been slow so far.

A link aggregator by its nature can cover more cities with less investment. Lycos City Guide has pages for more than 400 U.S. cities, and Yahoo!'s Get Local! can create a local page for any ZIP code in the U.S. Being able to have your own city page when Sidewalk isn't staking out your town can bring you closer to

HOT TOWN

Summer in the City *As you rack up frequent-flyer miles traversing the country, don't forget to have some fun. Take a couple of hours to tour these 20 major cities with the Web regional guides we review; then use your lunch break—or take an extra day—to hit the streets and explore.*

Go West

Watch the traffic go by over the SR 520 Floating Bridge in **Seattle**, thanks to **Sidewalk's** Trafficview closed-circuit camera. . . . Get information on **Portland's** eclectic museums, from the American Advertising Museum to the Cowboys Then and Now Museum, at **DiveIn**. . . . Use **CitySearch** to scare up a game of Ultimate Frisbee in one of **San Francisco's** parks. . . . Before you hit the links in **Los Angeles**, go to **Pacific Bell At**

Hand

for comprehensive golf-course information. . . . When your laptop dies in **San Diego**, use **Pacific Bell At Hand** to find the closest repair center. . . . Explore the trails in **Phoenix** using **Excite City.Net** to find the perfect hiking route for you. . . . Take care of yourself in **Denver** by looking at **DiveIn's** health care resource pages. . . .

Midwest

Avoid the crowds at Mall of America and shop online using the classifieds



Editors' Choice

• CitySearch



Beauty in a Web regional guide lies in the eye of the resident. Each service has different coverage areas, so your

favorite will obviously depend on what's available in your city. But if our Editors' Choice, CitySearch, does not have an outpost in your town, consider petitioning your mayor to fight for one—or moving.

CitySearch gives you the most local flavor for the cities in which it has hung out a shingle. Its listings of community events, local or-

ganizations, and shopping information are without peer. CitySearch is easy to navigate and provides impressive customization features with its Scout service, and its sassy, whip-smart writing style makes it a fun read every day. CitySearch is ideal for residents but can be a valuable tool for travelers too.

Pacific Bell At Hand, though limited to California, is the ultimate guide to that state, especially for travelers. The planned itineraries for day trips, masses of packaged content, and excellent mapping and site navigation make it a must for anyone visiting or living there.

Yahoo! Metros aggregate the most links to information. These sites are particularly notable for their classified advertising sections and easy links to local transportation.



understanding the fiber of your community through the Web.

BRAND-NAME DEALS

These guides may seek to replace your print yellow pages, maps, and entertainment magazines, but none of them build their sites entirely from scratch. Content partnerships, strategic alliances, and using what you bring to the table are crucial aspects of the Web regional guide game.

Pacific Bell uses its own yellow pages on its site, and Cox Enterprises and Tribune Co. use their own local newspaper and other media content to feed their sites. For those without such built-in advantages, the options include partnering with local publications and TV stations, as CitySearch and Yahoo! do. And almost everyone has a deal with prominent alternative weeklies around the country for local entertainment listings.

We tested each service by evaluating all of its active sites from the viewpoints of both traveler and resident. Except for Digital City, which has an AOL version and was rolling out its Web sites at press time, the services are free. The ten reviews and our look at the offerings in the computer industry's top ten travel cities seek only to save you time by pointing you in the right direction. Locate the services that have a site in your city and explore for yourself.



at **Yahoo! Twin Cities**. . . Use **Digital City Chicago's Go Guide** to find a great way to blow off steam; you can choose any activity from archery to yoga. . . Visit the online showrooms of Ford and Chrysler through a link from the **Detroit** pages of **Lycos City Guide**.

The Eastern Bloc

Find out which bands are playing the clubs this weekend with **Digital City Boston's** live-music listings. . . Browse **CitySearch** to locate the closest book reading near you when you're in **New York**. . . Track down an old college buddy in **Philadelphia** using **WhoWhere?** on **Lycos City Guide**. . . Get the latest congressional cloakroom gossip before visiting the Capitol at **Yahoo! Washington, D.C.**



South by Southwest

Pick the best place in **Austin** to smoke a Macanudo with a fellow aficionado using **Austin360.com's** helpful guide. . . Tour all that **Dallas** has to offer without leaving

your room with **CityView's** Virtual Tour. . . Sample the best of the **Raleigh/Durham/Chapel Hill** barbecue joint Web sites at **CitySearch** before trying the best BBQ on earth. . . Sort out all those streets named Peachtree in **Atlanta** (about 55 at last count) with **Yahoo!**'s helpful mapping and links to mass-transit sites. . . You won't even need an E-



Ticket to ride on over to Theme Park Central at **Digital City Orlando**. . . Get a hotel right on **Miami's** South Beach using **City.Net's** travel service, from **Excite**.

CITYSEARCH INC.

CitySearch

www.citysearch.com

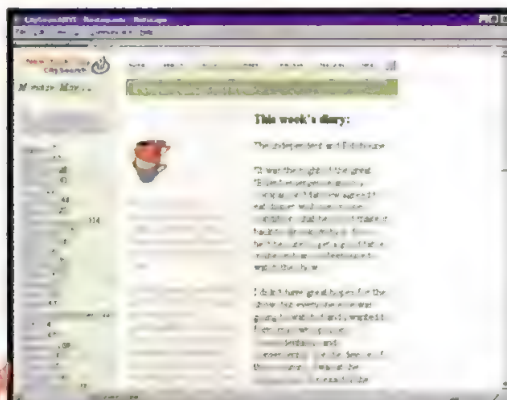
Although currently available in only a few cities, CitySearch covers those with breathtaking scope, timeliness, and depth. This superb service offers detailed, witty surveys of shops, services, food, drink, and entertainment and other local events in New York, San Francisco, Raleigh/Durham/Chapel Hill, Pasadena, Austin, and Salt Lake/Park City—with Nashville and Portland expected to be up and running by the time you read this.

The New York site is a revamped version of the former Metro-

Beat site, which CitySearch acquired in 1996. CitySearch built its other sites from the ground up. Each city has thousands of listings, each admirably up-to-date, and scores of new listings are added daily.

A horizontal toolbar on each page leads to main categories, including dining, entertainment, and news. A vertical menu of topics, different on each page, leads to subcategories like French restaurants and ice-cream parlors. A prominent search menu lets you go directly to the vendor or category you choose. From there, you

CitySearch's top-notch navigation makes it easy to find what you want quickly.



SIMPLY THE BEST No other service covers cities with such authority, style, and comprehensiveness. CitySearch is easy to navigate and has stellar personalization features.

can get an address and a phone number, travel directions and a map, and find other locations nearby. Businesses can purchase a Web page on CitySearch to provide more information, such as menus.

A "scout" feature, which automatically e-mails you about upcoming events you specify, has an impressive database of performers. It alerted us in plenty of time to catch performers as varied as Cecilia Bartoli and Howling Maggie, although it did miss a free performance by the popular medieval-music group Anonymous 4.

Interactive features are readily available but not widely used. You can visit a local chat room, but you probably won't find anyone else there. You can add your own comments about any vendor or location described in the service. Each city site has local message boards, such as one in San Francisco on the Muni. Many boards have no messages at all, while others attract two or three messages per week.

If you want to learn everything about a city's events, hope it has a CitySearch.—Edward Mendelson
CitySearch. CitySearch Inc., Pasadena, CA.

COX INTERACTIVE MEDIA INC.

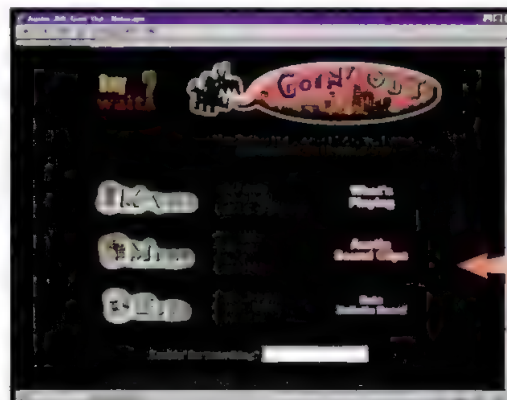
CitySites by CIM

www.cimedia.com

Using content from the newspapers and radio and TV stations owned by its parent company, Cox Enterprises, Cox Interactive Media has created sites that cater mostly to locals rather than to both travelers and residents, the way CitySearch does. AccessAtlanta (www.accessatlanta.com) and Austin360 (www.austin360.com), the sites up at press time, serve as fine enhancements or replacements for the local paper or TV station, though the lack of maps and customization features makes these sites less useful overall. Also, the clumsy organization can make it difficult to get to what you want quickly.

Each page includes links to all major categories of information within the site, although these categories are plagued by vague names such as Attitude and Local (we thought the whole site was supposed to be local). Cross-references between the various sections are in short supply, sometimes making it hard to find information.

Cox is off to a good start with the content on these sites, with interesting features and topical stories, but it hasn't gone far enough for the Web. The sites provide addresses and phone numbers for places of interest but no interactive



LOCAL FLAVOR Although they may be difficult to navigate, CitySites by CIM such as AccessAtlanta.com and Austin360.com deliver lots of interesting content for city residents.

maps or directions to help you get there.

The services also fall short on customization. AccessAtlanta allows users to create a personalized news profile, but the layout of the custom page is awkward. You cannot limit your news items by keyword or indicate how many headlines you want to receive.

AccessAtlanta and Austin360 work best as community centers, though they would have greater value as such if they included more information on local shops and businesses. In addition

to bulletin boards and chats, Cox uses its local radio stations and newspapers to offer regional news and classifieds. New feature stories and events listings are posted about once a day, and headlines from the Associated Press are updated continually.

Although neither AccessAtlanta nor Austin360 may be your first choice for information on those cities, the classifieds and coverage of local news and events that they provide make them worth a look.—Nancy Sirapyan
CitySites by CIM. Cox Interactive Media, Atlanta.



CONTENT IS KING

To make a great Web regional guide, sometimes it's best to have some help. Find out who's partnering with whom and who's doing things right.

—Regina Kwon and Andrew Boscardin

***** = BEST	Entertainment listings	Mapping	News and weather	White and yellow pages	Sports and recreation
CitySearch	★★★★★ Local partners include <i>TimeOut New York</i> and <i>Salt Lake/Park City's FM100</i> . Pros: So much information. Cons: None.	★★★★★ CitySearch provides its own maps and links to local resources. Pros: Comprehensive. Cons: No door-to-door directions; can't link straight to maps from the home page.	★★★★★ Local and national partners, such as ABC News affiliates and Accuweather, supplement staff efforts. Pros: Well-implemented. Cons: Not yet in every city.	★★★★★ Four11 service locates people. CitySearch finds businesses by name or category. Pros: Well-integrated instant mapping. Cons: None.	★★★★★ Staff writing, user input, and information from news affiliates drive these sections. Pros: Fun, fresh writing with lots of local content. Cons: None.
City Sites by CDM	★★★★ Culled from the <i>Atlanta Journal-Constitution</i> and the <i>Austin American-Statesman</i> . Pros: Great interface, lots of info. Cons: No search function on the Music pages.	N/A	★★★★ Sources include WSB radio/TV, the <i>AJC</i> , the <i>AAS</i> , KVUE 24 TV, and the Associated Press. Pros: Plenty of info. Cons: Poor organization.	N/A	★★★★ Sports news from the <i>AJC</i> and the <i>AAS</i> . Pros: Great local coverage. Cons: Hard to find info on recreational sports.
CityView	★★★ CityView-generated listings. Pros: Usually up to date. Cons: Sporadically available, no links or maps.	★★★ Some mapping (in the Dining area, for example). Pros: CityView has maps. Cons: They're scarce and nonintuitive.	★★★ Weather info from the NOAA; rare links to local media. Pros: Lots of weather stats. Cons: Unpleasant layout; no real news.	N/A	★★★ CityView-created listings. Pros: Links to amateur and university sports information. Cons: Some incorrect info.
Digital City (AOL)	★★★ Digital City-created guides supplemented by info from <i>Billboard</i> and some local media. Pros: Diverse sources. Cons: Confusing presentation; actual listings in plain text.	★★★ MapQuest mapping through yellow-pages searches, some cities have mass transit maps. Pros: Good for taking the bus or subway. Cons: No directions; no user-directed mapping.	★★★ Partnerships with local TV and radio stations and newspapers. Pros: Plenty of accurate information. Cons: Cramped presentation.	★★★ Switchboard provides searches for individuals and businesses. Pros: Instant mapping for businesses. Cons: No e-mail searches or dynamic links.	★★★ Local media partners provide news, articles, and statistics. Pros: An unusually full plate for the sports fan. Cons: Not much for the recreational athlete.
Diveln	★★★ Local and national sources, such as <i>MovieLink</i> and <i>Atlanta Magazine</i> . Pros: in-depth info. Cons: Awkward presentation.	★★★ Vicinity Corp. serves up maps. Pros: Pleasant layout. Cons: Sometimes inaccurate; no instant mapping of recommendations.	★★★ Many partners, such as Aspen Snowmass Online. Pros: The impressive Weather Channel page. Cons: Little hard news.	★★★ Diveln's parent company, US West, provides the yellow pages and Four11 the white pages. Pros: High quality partners. Cons: Poor interface; no instant mapping.	★★★ Content partners include golf.com and <i>Windy City Sports</i> . Pros: Great recreational sports focus. Cons: Clumsy interface.
Excite City.Net	★★★ Reprints Reed Travel Group reviews and features, useful links. Pros: Quick insights into a city. Cons: No hyperlinks in reviews.	★★★ Maps by MapQuest and Magellan Geographix. Pros: Fairly accurate. Cons: No direct links from recommended locales.	★★★ Links to good weather sites and many newspapers. Pros: Quick to find. Cons: Occasional dead links.	★★★ WhoWhere? and BigBook. Pros: Mapping and directions. Cons: Yellow pages seem less up to date than other services.	★★★ Links to national and pro team sites. Pros: Great links to pro info. Cons: Little for the weekend warrior.
Lycos City Guide	★★★ Links to area print and online publications. Pros: Variety. Cons: Not enough to bring you back.	★★★ Mapping services by MapQuest and Vicinity Corp. Pros: Maps and directions. Cons: Only available for some listings.	★★★ Links to area publications and to The Weather Channel. Pros: Has news and weather. Cons: No compelling reason to look here for those things.	★★★ Dun & Bradstreet's Companies Online, GTE SuperPages, and InfoSpace. Pros: Prominent search fields. Cons: Yellow-pages implementation odd and unhelpful.	★★★ Local papers and sports team links, returns of a GTE SuperPages search. Pros: It's clear what you'll find. Cons: The pickings are slim.
Pacific Bell At Hand	★★★★ Prominent partners include Siskel's Flick Picks and Zagat surveys. Pros: Top-notch info and plenty of it. Cons: Layout sometimes feels scattered and a tad inconsistent.	★★★★ At Hand's technology uses Thomas Bros. maps. Pros: High-quality maps from California's definitive mapmaker. Cons: No door-to-door directions.	★★★★ Content providers include <i>Billboard</i> , <i>The Hollywood Reporter</i> , and <i>People</i> . Pros: Elite entertainment news. Cons: No other news or weather.	★★★★ Pacific Bell's own yellow pages. Pros: Trusted brand name, ever accessible. Cons: No white pages.	★★★★ Numerous partners include <i>Golf Digest</i> , <i>Hearst HomeArts</i> , and <i>Tennis</i> . Pros: Excellent resources for recreational sports. Cons: Little pro coverage.
Sidewalk	★★★★ Local alternative publications, such as <i>Eastsidewalk</i> in Seattle and the <i>Manhattan User's Guide</i> in New York. Pros: Local flavor, local flair. Cons: None.	★★★★ Microsoft's own. Pros: Cleanly integrated. Cons: No directions; not available from every page.	★★★★ Local news from area publications; no weather. Pros: Microsoft concentrates on the local angle. Cons: If you don't know the weather, how will you know what to wear?	N/A	★★★★ Original content spotlights recreational sports; touches on pro teams. Pros: Inventive and useful. Cons: Some coverage feels lightweight.
Yahoo! Metros	★★★★ Many links, plus partnerships with regional media, such as <i>The Village Voice</i> in New York. Pros: Quick info. Cons: Integration could be better.	★★★★ Vicinity Corp. maps and directions. Pros: Well integrated; quick mapping and good directions. Cons: None.	★★★★ National partners Reuters and UPI join with numerous local TV and print publications. Pros: Good news, everywhere you go. Cons: Navigation gets tiring.	★★★★ Four11 and LookUp USA let you find people and businesses. Pros: Quick responses and excellent partners. Cons: None.	★★★★ Stories and stats from news wires and local sports organizations. Pros: Great coverage, well integrated. Cons: Bland interface leaves you cold.

N/A—Not applicable. The service does not provide this feature.

NEW PATH MEDIA

CityView

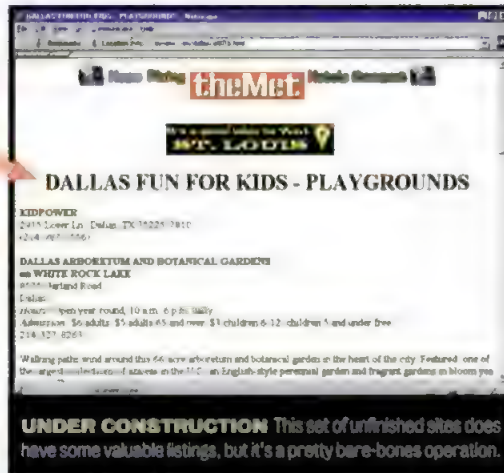
www.cityview.com

Strip away the interactivity, interface design, logical navigation, and most of the content that distinguishes the other sites in this roundup, and you'd have something similar to New Path Media's CityView. No other site in this review features such a clean, straightforward interface, but the dearth of content behind it is alarming for a professional venture.

Each of the 28 cities that make up the service is represented by 16 categories that include shopping, events, travel, and weather. During our testing period, many of the categories led us to a Coming Soon page, or to an offering so sparse as to be almost laughable. We haven't counted, but we feel sure that Philadelphia has more than eight hotels and Washington, D.C., more than three bookstores.

CityView's content generally consists of static address listings and, if you're lucky, telephone numbers and a couple of descriptive sentences. Only in the Dining section do you see any attempt at interactivity. There doesn't seem to be any effort to build a community of users in the way DiveIn and Digital City do.

It's not pretty, but CityView does a fine job with listings for kids and family activities.



Yet CityView is so wildly uneven that the service does have some bright spots. The events listings are mostly current, and some categories are even helpful. In most cities, for example, you'll find diverse and interesting activities for children, an area in which most other services are lacking.

The Dining page presents a city map and search fields. You can search by restaurant name or cuisine; you select a neighborhood by clicking on it on the map. The search mechanism is flawed, however. Selecting "American" as the cuisine, for example, will return Polish-American, Italian-American, and Jamaican-American restaurants but no establishments serving classic American food.

CityView makes it difficult to navigate around its various areas. Once you have entered a section, the only other categories you can jump to from the title bar are usually Dining and Hotels. You must return to the city's home page in order to access any of the other categories.

If you have kids, check out CityView. Otherwise, steer clear of this venture for some time.—Karen J. Bannan
CityView. New Path Media, Dallas.

DIGITAL CITY INC.

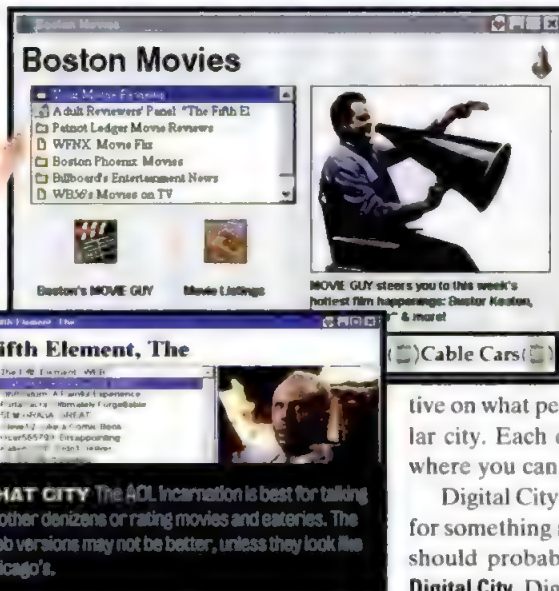
Digital City

AOL keyword: Digital City;
www.digitalcity.com

Digital City, an AOL-based service owned jointly by AOL and the Tribune Co., is the guide to use if you prefer to wander aimlessly instead of going directly to where you want to be. It doesn't provide in-depth coverage of a city, although it does offer links to independent services, such as the Zagat guides and local newspapers.

When we reviewed it, this service covered 14 major U.S. cities, including Chicago, San Francisco, and San Diego, and linked to random information on medium-size cities. Digital City should be on the Web by the time you read this; four affiliate sites run by Tribune Co. (Chicago; Hampton Roads, Virginia; Orlando, Florida; and Miami/Ft. Lauderdale) were already up at press time. The Web-based sites differ greatly from one another in tone and style and, except for the Chicago site, lean heavily on regional newspapers, making them best for locals. Digital City also owns Total NY (www.totalny.com), but it has yet to be integrated into the network as CitySearch did with the New York MetroBeat site.

Make your voice heard on everything from movies to restaurants at Digital City.



On AOL, each city's main window includes a brief list of new items and links to pages on news and weather, sports, entertainment, people, shopping, events, and travel, along with three or more ads. The sports, weather, and news pages are up-to-date, but the entertainment pages are poorly organized and

coverage is spotty. Other content takes you to the Web or to AOL itself, with no buttons or keyboard shortcuts to return you to a previous window or stop an operation.

The best feature of Digital City is that it offers so many outlets for expressing yourself. The reader-supplied reviews of everything from movies to restaurants provide a good grass-roots perspective on what people like and dislike in a particular city. Each city also has its own chat room where you can meet your fellow city dwellers.

Digital City can be fun, but if you're looking for something more stimulating than chat, you should probably start somewhere else.—EM
Digital City. Digital City Inc., Vienna, VA.

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Mag InnoVision DX1595	0.28	1280x1024	30-65	429	PanaSync S17	0.27	1280x1024	30-69	799	Sony CPD300SF	0.30AG	1600x1200	30-85	1999
Viewsonic 15GS	0.28	1280x1024	30-69	429	ViewSonic 17GS	0.27	1280x1024	30-69	699	ViewSonic PT810	0.30AG	1600x1200	30-96	1899

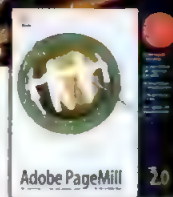
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PC Magazine, Jan. 7, 1997
Best of Year Award

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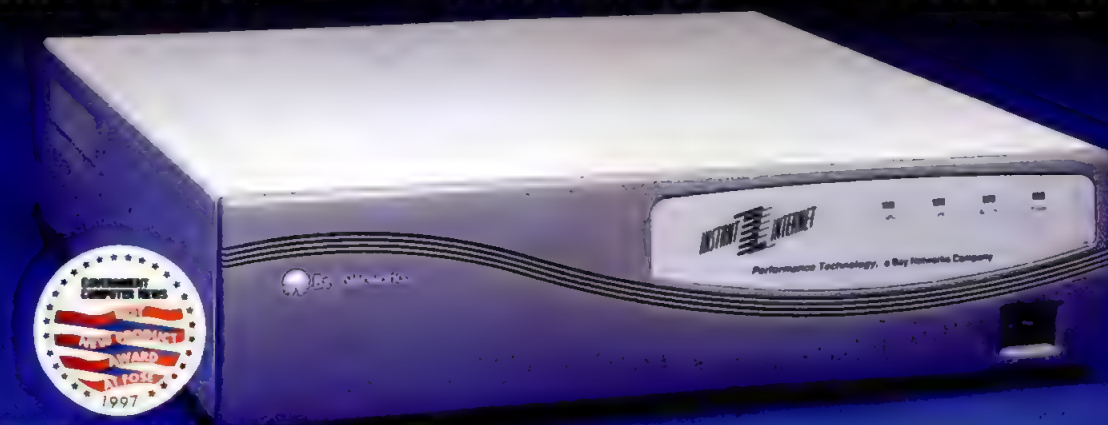


Network Computing, Sept. 15, 1996
Editor's Choice Award

"...easy installation, superior management features, and good performance..."



PC Magazine, Nov. 19, 1996
Editors' Choice Award



Government Computer News, 1997
Best New Product Award

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US WEST INTERACTIVE SERVICES GROUP INC.

DiveIn

www.divein.com

With a strong community focus and a reliance on user input, DiveIn, from US West Interactive, shows a lot of promise. But it currently lacks the depth of content of CitySearch and Sidewalk, and its interface could use a redesign. Keep DiveIn on your radar screen and revisit it a few months down the road.

As of this writing, DiveIn had ten city sites online, including Chicago, Los Angeles, and Seattle. We found the most developed content on its Denver and Atlanta sites.

One of the highlights of DiveIn is the ability to browse and review

any of the dozens of DiveIn sections corresponding to that city, such as dining, sports, and local business.

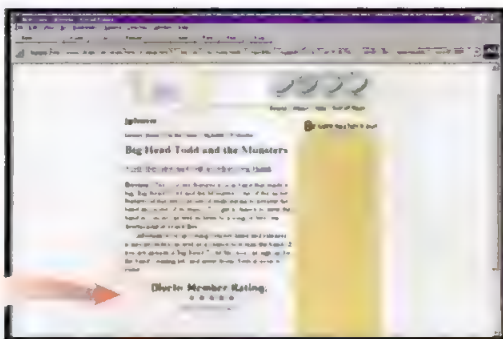
Each section's content is subdivided into general-purpose articles, event listings, city locations, and reviews of local Web sites. DiveIn's content comes primarily from DiveIn users and professional writers. In addition, DiveIn has agreements with more than a dozen third-party providers, such as CBS SportsLine and golf.com, to present more extensive information.

DiveIn's site layout is a significant problem. More effective sites, such as Pacific Bell At Hand, lead users in a natural way to the most

compelling information. DiveIn forces users to know what they want and to seek it out explicitly. And though some of the content is quite interesting, other elements, especially the contributions from end users, don't appeal to a general audience. It's difficult to pick out the good articles from the rest.

The content in DiveIn is geared more to residents than to visitors. When you register, you specify a city and create a personalized page containing links to

DiveIn's community-friendly approach lets users rate and comment on the service's links.



WATCH THIS SPACE Although DiveIn is not yet ready for prime time, a few tweaks to its interface and a deeper content pool may make it a player.

compelling information. DiveIn forces users to know what they want and to seek it out explicitly. And though some of the content is quite interesting, other elements, especially the contributions from end users, don't appeal to a general audience. It's difficult to pick out the good articles from the rest.

If DiveIn's creators redesign the site to emphasize its best features and present the content contributed by end users more effectively, the site should become one worth visiting.—John Garriss

DiveIn. US West Interactive Services Group Inc., Englewood, CO.

EXCITE INC.

Excite City.Net

city.net

Many sites can show you what's happening in your hometown, but no site rivals Excite City.Net for getting you up to speed on remote travel destinations. You'll find informative links for places around the globe and, for many large cities, useful essays and facts. City.Net lacks really good navigation and is not the best for up-to-the-minute information, but its deep content, coupled with a strong ticket-reservation program, make City.Net the premier site for planning trips.

City.Net opens with an interactive world map. Simply click on the area you want to learn about. For continents and countries,

City.Net features well-chosen links to sites that provide information on a location's languages, education, history, magazines, and newspapers. For larger cities, you'll find weather reports and links to sites on events, businesses,

hotels, transportation, and more. In general, City.Net contains many more links than Lycos City Guide but fewer than Yahoo! Metros.

For more than 50 large U.S. and foreign cities—including New York, Paris, Moscow, and Tokyo—City.Net provides useful

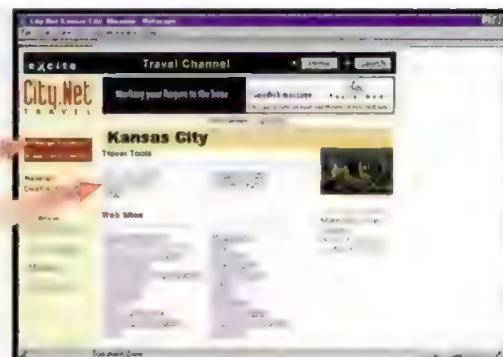
profiles in addition to Web links. These profiles, from Reed Travel Group, include essays on restaurants, hotels, sightseeing, shopping, and transportation, and Fact Sheets on everything from passport requirements and health warnings to advice on business practices and crime.

From any point in City.Net, you can access a reservation service operated by Preview Travel, a City.Net content partner. There you can make airline, car, and hotel reservations and set up a travel profile with your preferred airlines and your frequent-flier numbers.

City.Net does have flaws. Getting to specific cities can take a few

clicks, so you'll want to bookmark your favorite destinations. And the city profiles don't include relevant Web links. Also, City.Net uses Excite's search engine, so you must backtrack to Excite and specify City.Net under Options before running a search. And since much of the content consists of links and general advice, you won't get really up-to-date information. Still, City.Net is great for planning business trips and vacations, whether you're going to Bloomington or Beijing.—Kathleen Caster

City.Net. Excite Inc., Redwood City, CA.



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* All x2 products are capable of 56 Kbps downloads; however, due to FCC rules which restrict power output of service providers' modems, current download speeds are limited to 53 Kbps. Actual speeds may vary depending on line conditions. Uploads from users to providers travel at speeds up to 28.8 Kbps.

** An x2-capable modem, an x2-compatible analog phone line and an x2-capable service provider are required for these high speed downloads. See www.usr.com/x2 for details.

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To prove just how committed we are to x2, we're introducing "x2 Delivers," a special program that will show you why buying an x2 modem now makes so much sense:



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To get your free month of Internet service with an x2-capable Internet service provider, just complete and return the form below.

Then, you'll also be registered for the free upgrade. After the ITU-T standard for 56K modems is approved, we'll upgrade your U.S. Robotics x2 Technology 56K modem, free of charge. Since every x2 modem is equipped with Flash ROM, we expect the upgrade to be as simple as a software download from the Internet. If it's not, we'll replace your modem with one that does meet the new standard — free of charge. Register your modem, and after the 56K standard is approved by the ITU-T, we will notify you how and when to get your free upgrade. Approval is expected some time in early 1998.

And again, if you're not satisfied with your U.S. Robotics x2 Technology 56K modem, simply return it within 30 days of purchase, along with dated receipt, to the store or mail order reseller where you bought it for a full refund.

¹ Guaranteed upgrade valid for all currently available Sportster 56K Faxmodems (Models 1783, 1784, 1785, 1786, 1787 and 1789), Courier 56K Faxmodems (Models 1867, 1868 and 1869) and Megahertz 56K PC Card Faxmodems (Models XJ1560, CC1560, XJ5560, CC5560). This offer valid in the U.S. and Canada only.



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1. Buy any Sportster, Courier or Megahertz modem listed below between June 1 and September 15, 1997
2. Call 1-800-525-USR1 or visit <http://x2.usr.com/connectnow> to find out if your current ISP has live x2 service now. If not, choose one of the x2-capable ISPs listed there.
3. Fill in all requested information on this form.
4. Enclose this completed form with a copy of your dated modem receipt, original UPC bar code symbol and serial number from the modem package (see samples below) and proof of your x2 ISP monthly fee (credit card bill or monthly statement) and mail to:

U.S. Robotics, x2 Delivers, PO Box 8061, Young America, MN 55551-8061

(Any questions regarding this program, please call 1-800-727-2107.)

(Please print all information clearly.)

Name _____

Address _____

City _____ **State** _____ **ZIP** _____

Phone _____ **E-mail Address** _____

Retailer / Mail Order where modem purchased _____

ISP Name _____ **Monthly fee** _____

Internet service offer valid with purchase of Sportster 56K Faxmodems models 1783, 1784, 1785, 1786, 1787 and 1789, Courier 56K Faxmodems models 1867, 1868 and 1869 and Megahertz 56K PC Card Faxmodems models XJ1560, CC1560, XJ5560, CC5560 only, purchased between June 1, 1997 and September 15, 1997. Request must include copy of dated modem sales receipt, actual UPC bar code and serial number from the modem package, and proof of x2 ISP monthly fee. One Internet service refund per address. Not responsible for lost, late or misdirected mail. Request must be postmarked by November 15, 1997. Valid in U.S. and Canada only. Not valid with any other offer. Please allow 6 to 8 weeks for receipt of check. Consumer is responsible for payment of monthly fee to service provider.

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SERIAL NUMBER SAMPLE



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7-38168-00682-3	6-42662-52776-1	6-42662-52939-0	6-42662-52778-5
6-42662-52823-2	6-42662-52825-4	7-38168-00686-1	7-38168-00669-4
7-38168-00670-0	7-38168-00687-8		

Tape serial number & bar code over this box.

Although their strong brand names and deep resources make newspapers capable of providing sites just as rich as the Web regional guides we review here, few have done more than post previously published articles. Now, however, as many papers realize the extent to which powerful Web regional guides can wreak havoc on a local newspaper's subscription base and its classified and display advertising sales, some are turning to Zip2 Corp. for the advice and technological know-how with which to pull together all their assets.

Newspapers license a customized package from Zip2 that may include a yellow pages service; mapping and directions areas; arts, entertainment, and city guides; and auto and real-estate finders. The software architecture is built to accommodate each newspaper's legacy data, and a NetObjects Fusion front end lets editors update and change material quickly without learning HTML. Each paper can also customize the product to get a particular look and feel, though the actual information remains on Zip2's server. (Softbank, the parent company of Ziff-Davis, publishers of *PC Magazine*, is an investor in Zip2.)

The first newspaper sites powered by Zip2 are the San Jose Mercury News (www.sjmercury.com) and the Contra Costa Times (www.hotcoco.com). Jointly, they have created an arts and entertainment guide, Just Go Bay Area, presented as a subsite available from each site's home page. Just Go features a compact, thoughtfully designed interface with an ever-present menu bar. Click on one of the three categories—Movies, Dining, and Music—to reveal more choices; you can view listings, conduct

Just Go's well-integrated features will be appearing soon on a newspaper site near you, courtesy of Zip2.

Newspapers

FIGHT BACK

By Regina Kwon

though slow response times and other kinks make using them a bit difficult. As with CitySearch, you can create a custom profile of your interests and tastes, and the site will notify you by e-mail when the musicians and movies you specify come to town.

Just Go Bay Area was the only Zip2-powered site running

refined searches, and read the site's recommendations.

Drilling through categories brings you to reviews and descriptions of events, movies, and restaurants. The content, derived mostly from the partner newspapers, is seamlessly integrated into the technological back end built by Zip2.

Just Go supplies the kind of comprehensive listings you would naturally expect from your local paper. Yellow pages information and an interactive map accompany every entry, and you'll often find detailed door-to-door directions as well. Java versions of Just Go's maps are available,

during our review period. By the time you read this, sites for the *Philadelphia Inquirer* (www.inquirer.com), the *Miami Herald* (www.herald.com), and a Twin Cities newspaper, *Pioneer Planet* (www.pioneerplanet.com), should also be available. Zip2, which plans to solidify partnerships with 26 more newspapers by the end of this year, sees itself as facilitating relations among its partner papers. For example, each newspaper in the Zip2 network will have the option to participate in a content-sharing agreement with other Zip2 papers, through which reviews of movies or events it has not yet covered would be provided on its site. So far, Zip2 has partnered with Knight-Ridder, *Times Mirror*, and several individual papers in the McClatchy and Scripps Howard chains.

If Just Go Bay Area is any indication, your local paper is well equipped to defend its territory online.

Zip2 Corp., Palo Alto, CA; www.zip2.com.

Just Go Bay Area website interface showing a map of Palo Alto and a listing for Zao restaurant.

Zao
261 University Ave
Palo Alto, CA
(415) 328-1988

Even the noodles don't cut it at Zao's

By Sheila Himmel
San Jose Mercury News
Published Friday, June 6, 1997

ZAO MOVED into the Miyake slot on Palo Alto's University Avenue two and a half months ago, when the popular sushi bar moved up the

ABOUT THE RESTAURANT

Rating
4.5/5

Payment Methods
MasterCard
Visa

Cuisine Type
Trendy noodle bar
American, Asian

Alcohol
Beer and wine

Meals Served
Lunch, Dinner

Prices
Inexpensive

Reservations
Recommended

Other Features



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It remembers (so you don't have to):

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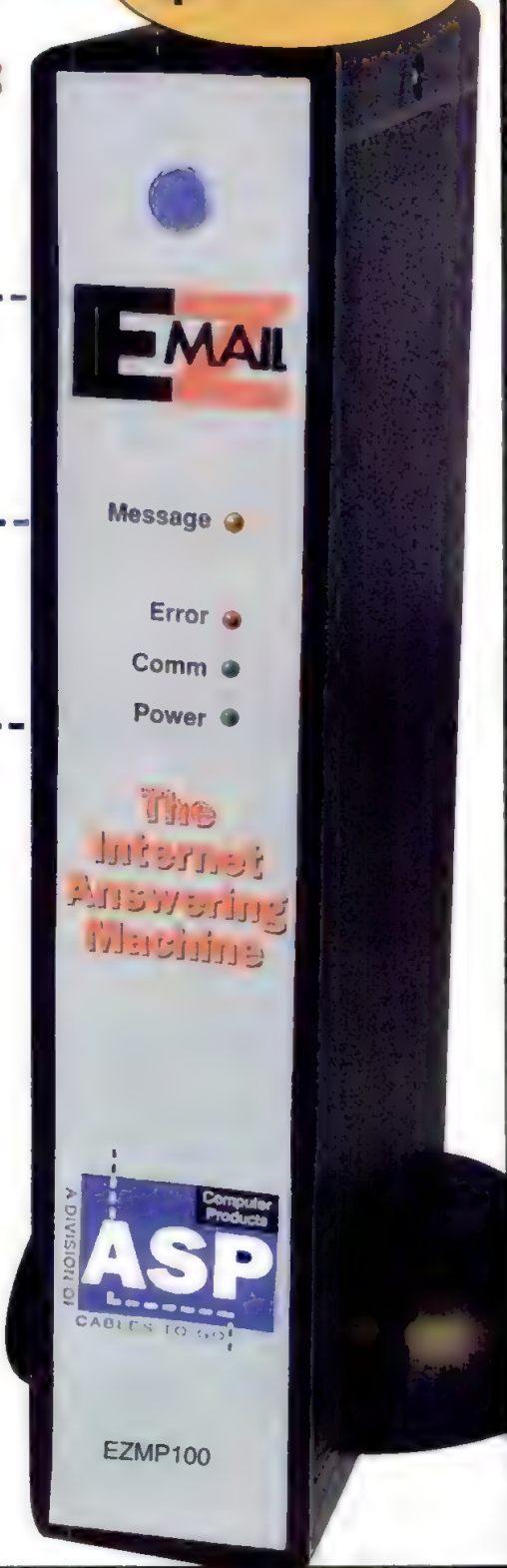
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LYCOS INC.

Lycos City Guide

Though broad in scope, Lycos City Guide does not cover most major cities with the depth of its closest analogue, Excite City.Net. Additionally, the poor integration of City Guide's various services is a hindrance. It may be the best bet for smaller cities, however; the essays and links for a Chico, California or an Augusta, Georgia, for example, are often better than those of City.Net or Yahoo! Get Local!

City Guide has a worldwide range, covering more than 400 cities in the United States alone. Each city has a tour page with a brief, clever essay about the city, and a number of links related to the fabric of the city. For example, Los Angeles has a set of links, called Nobody Walks In L.A., on getting around town. Each U.S. city also has a resource page featuring a map; company-, people-, and address-finding services; and news, weather, and travel links. Overall, City Guide provides a good set of links, and it mostly avoids the dangers of trying to be everything to everybody. Although some linked information sources are obviously not best of breed, many are.

The resource pages expose City

cityguide.lycos.com

Guide's greatest weakness: the poor integration of its various services. When you search for a local company, you're sent off to Dun & Bradstreet's Companies Online, with no easy link back to City Guide. The same is true for the white and yellow pages services.

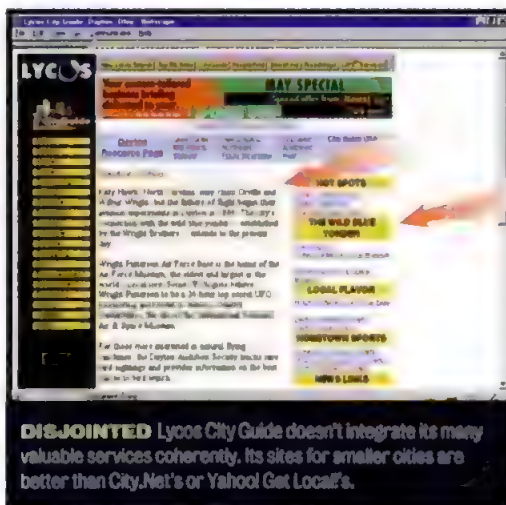
Navigating can be confusing. You start from an image map of the world, then click on a continent, then a state (which usually brings up an entire region), and then you select a city from a list alphabetized

by state. Because the information you receive is within the linked sites, remembering where you are

Lycos City Guide covers smaller cities, such as Dayton, like the dew.

Since the essence

of the service is to link you to information, finding several broken links disturbed us. But even though some city pages are maintained better than others, all those we visited delivered at least some good information. Lycos City Guide might not be the guide of choice for a large metropolis, but it could suit your needs in Hometown, U.S.A.—J.C. Love
Lycos City Guide. Lycos Inc., Framingham, MA.



PACIFIC BELL INTERACTIVE MEDIA

Pacific Bell At Hand

The best thing about Pacific Bell At Hand is the quality of its content. At Hand is like a conventional travel guide on steroids, providing reviews, new perspectives, and commentary on living and traveling in California. The excellence of its content partners makes At Hand a must-visit for anyone living in or traveling to the state. The only thing this guide lacks is the rich, original editorial content of CitySearch and Sidewalk.

At Hand starts with a comprehensive listing of every major business in California. Pacific Bell produces the state's standard yellow pages, so the breadth of listings didn't surprise us. You can search by business name or type, or use a set of predefined categories. For each business, At Hand provides the address and a Thomas Bros. street map. Registering with At Hand lets you perform proximity searches to find businesses near your home address.

You'll find a wealth of third-party information here. At Hand has partnered with dozens of content providers, from traditional magazines such as *Popular Mechanics* and *Golf Digest*, to spe-

www.athand.com

cialized services such as the California State Parks Association and the California Real Estate Association. For each partner, the At Hand editorial staff selects content for a California audience and presents it via a well-organized guide, such as one on in-line skating in California.

At Hand has also created guides to San Francisco and Los Angeles. For each city, At Hand provides typical tourist information, such as advice on transportation and day trips. You can also browse

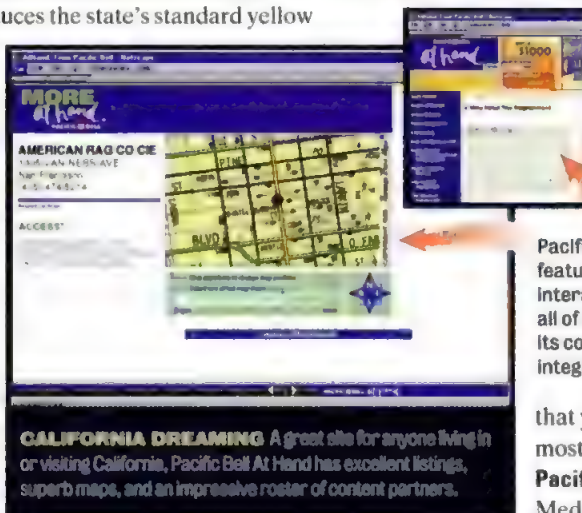
through the Zagat Survey section for excellent hotel and restaurant reviews and *BAM* magazine for the latest on California music and nightlife. At Hand also commissions fun articles from freelance journalists, such as a review of L.A. cigar clubs or a tour of San Francisco's

Chinatown. And the reviews of golf courses and beaches from Foghorn Press are invaluable. In fact, there's a lot of useful information in At Hand

Pacific Bell At Hand features superb interactive maps for all of California, and its content is well integrated.

that you're not likely to find anywhere else, and most of it is worth reading.—JG

Pacific Bell At Hand. Pacific Bell Interactive Media, Pasadena, CA.



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MICROSOFT CORP.

Sidewalk

www.sidewalk.com

An impressive guide to big-city life and leisure, Microsoft's Sidewalk offers a slew of valuable services for a wide audience. The site also showcases the power of customized information delivery over the Internet. But all is not perfect at Sidewalk.

At this writing, the burgeoning service offered guides to Seattle and New York, with Microsoft's hometown site far outdoing the New York incarnation. Sidewalk's original content, prepared by local writers and editors, has an authoritative voice and local color, but the site's navigation could be improved. And though Sidewalk particularly excels in covering food and events, it lacks CitySearch's depth.

Each city's front page features everything from music festivals to weekend getaways. Sidewalk's primary sections—Movies, Restaurants, Events, Arts & Music, Places to Go, and Sports—combine feature stories with listings. Much of the material is updated daily.

To focus on your own tastes, you can conduct refined searches or look to Sidewalk's Choice awards for direction. To customize Sidewalk, you set up a profile of your favorite cuisines, music, sports,

and other activities. Sidewalk then displays events that fit your profile. You can also receive weekly e-mail updates.

Navigating and searching the site is easy, but not as clear as it could be. You can jump to the home page or a subsection by using the drop-down pick list on each page, but the keyword box for searching the site is only on the front page. On CitySearch, you can access that feature from almost every page. Still, Sidewalk's Events listings do offer easy access to maps and lists of nearby restaurants.

Seattle Sidewalk offers Trafficview, a fabulous service with cus-

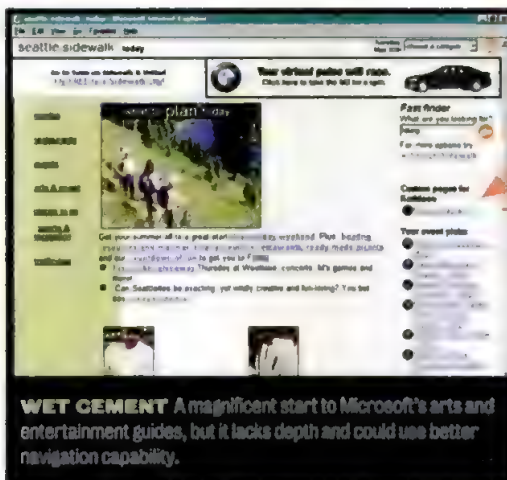
tomizable traffic reports, animated traffic-flow maps, and video cameras that let you see the traffic at key points. New Yorkers

Personalizing Sidewalk is easy; it will steer you where you want to go today.

have to get their traffic updates elsewhere, but the New York site does let users add their own reviews and get advice on living in the city.

You can expect ten more Sidewalk cities by year's end, including Boston and San Francisco. From what we've seen, each site will definitely merit a long stroll.—KC

Sidewalk. Microsoft Corp., Redmond, WA.



YAHOO! INC.

Yahoo! Metros

www.yahoo.com

Featuring the familiar Yahoo! interface, the Yahoo! Metros are the best of the link aggregators at covering major metropolitan areas. You'll find it easy to start on your quest for information within a city, but as with any link-aggregator site, you have to remember where you are and where you came from.

Since Yahoo! Metros are focused on providing links to information sites, the quality of the information you obtain varies. We found the sites linked from Yahoo! Metros to be generally as good as or better than those we found through other services such as DiveIn and Excite City.Net.

Yahoo! Metros do not feature any personalization capabilities as CitySearch and Sidewalk do, and we didn't find any such features for any of the linked information sites, either. We found that Yahoo! Metros featured strong classifieds, transportation, and community features, and fared best in cities where they didn't have to compete with CitySearch or Sidewalk.

There are links to all the information you'd expect: special events, sports, traffic, lodging and dining, plus local fea-

tures, classified ads, alternative lifestyles coverage, and even a link to Yahoo! chat rooms. Subjects specific to individual cities are not overlooked, either. For example, you can review Billboard Charts from Yahoo! Los Angeles, and the New York, New Jersey, and Connecticut Lottery results from Yahoo! New York.

At this writing, Yahoo! Metros were in 11 cities. If you don't have a Yahoo! metro site in your city yet, you should try Yahoo!'s Get Local!, where you can enter your zip code and get the news,

classifieds, and relevant links for your area. You can also access Yahoo!'s chat, maps, and yellow pages features, which are national in scope.

As you would with any link aggregator, we did find some broken links.

Overall, however, the Yahoo! Metros sites impressed us with their clear, useful links to high-quality, relevant information. (Softbank, the parent company of PC Magazine and Ziff-Davis Inc., is an investor in Yahoo!.)—JCL

Yahoo! Metros. Yahoo Inc., Santa Clara, CA.



LINK ME UP Viewing a Yahoo! for your town, you get the same indexing acumen you're used to with the big Yahoo!, but with mapping, classifieds, and chat built-in.



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JDK 1.1 and Java Beans support	yes	no

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PC Magazine's LINKING around town

Let the Web guide you to the best of what the top ten travel cities have to offer for food, fun, and more.

As the Web regional guide market explodes, knowing where to turn for the best advice on thrift stores or French restaurants becomes more difficult every day. We took a hard look at the major players in each of the computer industry's top ten travel cities and evaluated their sites in the nine categories you care about most, whether you're a resident or a traveler. Look for the  to find the winners in each category. These are the sites that will lead you to the most useful information in the most appealing way.

Atlanta



As the newest addition to the pantheon of international cities, Atlanta deserves a world-class Web regional guide. Yahoo! comes closest with its Olympian links and its excellent use of content from such partners as Atlanta Magazine. Digital City, more than any other site, succeeds at creating a sense of community. Cox's locally produced AccessAtlanta.com is the place to be to follow the active local prep, college, and pro sports scene.—NS

SITE

	AccessAtlanta.com	CityView	Digital City (AOL)	Diveln	Excite City.Net	Lycos City Guide	Yahoo! Metros
							
							
							
							
							
							
							
							
							

Austin



CitySearch and Austin360.com are breeding a rivalry that compares with the Aggies and the Longhorns. CitySearch has a superior interface, and its listings are often more complete. But Austin360.com's hometown tone and content—covering "Austin Beer, Java Joints, and Cigars"—may be more fun, and its local sports coverage, which includes a site dedicated to the Horns, is tops.—KJB

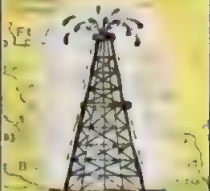
SITE

	Austin360.com	CitySearch	CityView	Excite City.Net	Lycos City Guide	Yahoo! Metros
						
						
						
						
						
						
						
						
						

INTERNET
Web Regional Guides

Boston		SITE				
	The beacon to which all other Boston Web regional guides look, Boston.com (boston.com) serves the olde towne with style. This hybrid site gathers links and incorporates content from The Boston Globe and Boston Magazine. The site is well laid out, with an easy-to-browse, tab-driven menu. The informative Dining area impressed us especially. —KJB	Boston.com	BEST	BEST	BEST	BEST
		CityView				
		Digital City (AOL)	BEST	BEST		BEST
		Excite City.Net				
		Lycos City Guide				
		Yahoo! Metros				BEST

Chicago		SITE				
	Yahoo's site and Digital City's Web outpost (chicago.digitalcity.com) best cover this toddling town. Yahoo! forces you to dig a bit for the links you want but is ultimately worth the effort. Digital City (Web) shames its disappointing AOL sibling and most other sites; its reviews, features, and searchable listings make planning quality time a breeze. DiveIn's pages are well intentioned but don't quite make the grade. —RK	CityView				
		Digital City (AOL)				
		Digital City (Web)	BEST	BEST		BEST
		DiveIn				
		Excite City.Net			BEST	
		Lycos City Guide				
		Yahoo! Metros	BEST	BEST	BEST	BEST

Dallas		SITE				
	Considering how big a city Dallas is, its lack of a star Web regional guide that provides deep content is surprising. CityView, produced by a division of The Dallas Morning News, is disappointing, and the search engines are left to fill in the many gaps. —KJB	CityView		BEST		
		Excite City.Net	BEST		BEST	BEST
		Lycos City Guide				BEST
		Yahoo! Metros	BEST	BEST	BEST	BEST

Los Angeles		SITE				
	In a city of neighborhoods like L.A., providing a comprehensive guide seems to be harder than any one service can manage. Pacific Bell At Hand comes closest, with superior searching capabilities for dining and shopping and special options for registered users. CitySearch—which covers only one corner of the L.A. area—is absent from this chart, but it comes through in Pasadena, whether you're looking for a little old lady or a nightclub. —JCL	CityView				
		Digital City (AOL)				
		DiveIn			BEST	
		Excite City.Net				BEST
		Lycos City Guide				BEST
		Pacific Bell At Hand	BEST	BEST	BEST	BEST
		Yahoo! Metros	BEST		BEST	



So it wasn't a surprise that an EIZO monitor — which, by the way, is pronounced A-ZO — was picked as a *PC Magazine's* Editors' Choice in 1996, that is, the FlexScan® TX-C7S which boasts a showy 0.25mm pitch Trinitron® aperture grille tube firing up a high refresh rate of 1280 x 1024 pixels of your latest efforts across every square millimeter of the beaming flat square surface of this eye-pleasing TCO 95 as well as ISO 9241-3 certified beauty, while equipping you with edgy performance ideas like Dynamic Focus Circuitry delivering razor sharp focus and cracker crisp corner to corner resolution, not to mention the conveniently built-in DDC circuitry that's so completely compatible with Windows 95 Plug & Play and Windows NT 4.0, and which is not meant to slight the remarkably cost-conscious and conservation-minded PowerManager™ feature or the consistency-enhancing Distortion Elimination Circuit that, obviously, has something to do with eliminating distortion which it does and which is no distortion at all but rather a complete and total statement of fact that helps EIZO win over 65 major performance awards in such a highly competitive marketplace.

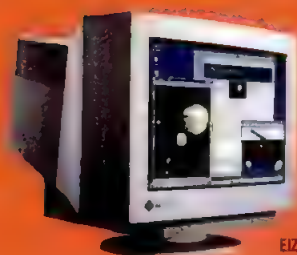
Whew, we said they were loaded. But, did we say that

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New York		SITE						
	No city was more ripe for Web sites that offer comprehensive, searchable listings of events than New York City. CitySearch stands out with its easy-to-navigate, thorough site filled with characteristic New York brio. Yahoo! excels in classifieds and transportation. Sidewalk was a touch green when we evaluated it, but it performed strongly in dining and in sports and recreation.—EM	CitySearch	BEST	BEST	BEST	BEST	BEST	BEST
		Excite City.Net						
		Lycos City Guide						
		Sidewalk						
		TotalNY.Com					BEST	
		Yahoo! Metros	BEST					BEST

San Francisco		SITE						
	Two guides rise above the rest in the Bay Area: CitySearch and At Hand. CitySearch, with comprehensive listings and home pages for local businesses, is clearly the site for residents. At Hand excels at recommendations for trips and excursions, with great reviews of golf clubs, beaches, and campsites. Zagat, an At Hand partner, provides invaluable restaurant and hotel reviews. Other sites, such as Digital City, also license Zagat listings, but At Hand has created the most compelling format.—JG	CitySearch	BEST		BEST		BEST	BEST
		CityView						
		Digital City (AOL)				BEST		
		Excite City.Net						
		Just Go Bay Area				BEST		
		Lycos City Guide						
		Pacific Bell At Hand			BEST			BEST
		Yahoo! Metros	BEST					

Seattle		SITE						
	Seattle must be one of the few cities on the planet where the Web is taken almost for granted. That Microsoft has created a Web guide to its hometown is no surprise, but the hands-down superiority of Sidewalk is. Entertaining, informative features and listings cover a multitude of places and events. Yahoo! has well-organized classifieds and useful listings for Seattle Web sites, including community centers and health services.—KC	CityView			BEST			
		Digital City (AOL)						
		Diveln						
		Excite City.Net						
		Lycos City Guide						
		Sidewalk			BEST	BEST	BEST	BEST BEST
		Yahoo! Metros	BEST	BEST				BEST

Washington D.C.		SITE						
	Digital City (AOL), capitalizing on its proximity to parent company AOL in Vienna, Virginia, has created the best all-around Web regional-guide offering in D.C. Yahoo!, with its demonstrated strengths in Classifieds and Transportation, easily wins those categories, and is the overall choice for non-AOL members.—KJB	CityView						
		Digital City (AOL)	BEST	BEST				BEST
		Excite City.Net			BEST		BEST	
		Lycos City Guide						
		Yahoo! Metros	BEST			BEST	BEST	BEST



Christian Murphy was non-verbal. He lived with a wall between himself and the world.



1 THIS IS CHRISTIAN.
He can see, hear, feel, touch,
but he cannot speak. He was born
with autistic tendencies that cut
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E500	1280 x 1024 @ 65Hz	119MHz	CROMACLEAR	0.25mm mask
E700	1600 x 1200 @ 65Hz	177MHz	CROMACLEAR	0.25mm mask
E1100	1600 x 1200 @ 65Hz	177MHz	Dot Trio	0.28mm dot



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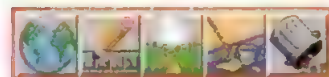
PC Tech



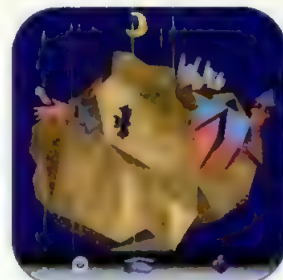
INSIDE

TUTOR: HTTP 1.1 and PNG are poised to help speed up an Internet slowed down by Web traffic. *Page 303.*

OPERATING SYSTEMS: Learning Linux isn't easy, but its power, versatility, and price (it's free!) make it worth the effort. *Page 311.*



INTERNET TOOLS: VRML brings 3-D virtual reality to the Web. Find out how VRML works and how you can enter and explore virtual worlds using it. *Page 315.*



Developing for Office 97

VBA is what you'll use to develop Office 97 applications. Will Microsoft Office 97 Developer Edition give you a head start?

By Will Fastie

The widespread acceptance of Microsoft Office in corporate America makes the release of a developer edition logical, at least on the face of it. After all, creating solutions using familiar applications makes sense, and having tools to make that task faster and easier makes even more. Unfortunately, Microsoft Office 97 Developer Edition (ODE) seems to lack a compelling *raison d'être*. The essential item in developing for Office 97 is not the set of tools in ODE but rather the new Visual Basic for Applications (VBA), which owners of any edition of Office 97 get without having to buy ODE. The truth is that ODE is a niche product, of interest to a narrow and very specific group of Office 97 developers.

WHAT'S INSIDE

The ODE box holds two major components: a full copy of Microsoft Office 97 Professional

Edition (you get the same CD that comes with Professional Edition), and ODE itself. Office 97 Professional Edition includes Word, Excel, Access, PowerPoint, and Microsoft's new personal information manager, Outlook. The suite has a comprehensive object model for all its applications, even the adorable—but effective—Office Assistant; object models surface whenever an application is running. The object model is used by VBA, the “macro language” for Office applications. You can write VBA code for repetitive tasks or simply record a macro as before; either way, you end up with VBA code.

You do not need ODE to record, write, or run Office macros or to write VBA code. You can use VBA to build as complex and as generic an application as you like, as long as it runs from within one of the Office 97 components. That means you can write, say, a specialized order entry system that runs from within Word, then deploy it

UTILITIES: ZDDesk lets you group programs on virtual desktops in Windows 95 and NT 4.0, alleviating Taskbar clutter. *Page 321.*

SOLUTIONS: Mixing EDO and non-EDO SIMMs, an Excel macro spells out numbers for printing checks, and more. *Page 351.*



PC Tech Online
All files mentioned in this section are available online from our Web site at www.pcmag.com



around your office or small business to any system that also has Word and any other component your application requires. Even Access applications can be distributed, if the user has a copy of Access 97.

That said, let's look at what comes in the box.

Access 97 runtimes: The more complex the application, the more likely it is to involve a database. Microsoft correctly assumes that such applications would be built using Access as the platform, rather than Word or Excel—especially because in addition to its obvious database features, Access includes better facilities for data entry (forms) as well as the only report facility in the Office 97 suite. ODE provides the files and the royalty-free runtime license that lets developers deploy Access-based applications on systems that do not have Access installed. ODE thus replaces the Access Developers Toolkit (ADT), which previously filled this need.

In fact, the best way to look at ODE may be as a reworked ADT; these Access runtimes are the most important components of ODE. The Setup Wizard, Replication Manager, and source code control tools all relate to Access rather than the Office suite generally, further reason to think of ODE as ADT, Version 97.

Microsoft Setup Wizard: If the applications you develop must be distributed widely, you'll probably want to create an installation program to automate the process. Microsoft's setup kit historically has been cumbersome to use. ODE's Setup Wizard runs from within Access instead of as a standalone application, which some developers won't like. But the Setup Wizard does have the advantage of economy; better installation programs like Great Lakes Business Solutions' Wise Installation System cost \$200. Spend the money if you do a lot of installations or complex ones (Wise is an excellent tool). If you build installers only occasionally, you can get by with the Setup Wizard.

Replication Manager: The Replication Manager is a visual tool for managing replicas, copies of a database that must stay synchronized so they can be shared by various people using different computers at different locations. The Replication Manager is not essential; replication can be accomplished without it. For example, the Windows 95 Briefcase handles replication, and the Data Access Objects (DAOs) provide methods and properties to

allow replication under program control. The Replication Manager, however, can help with large numbers of replicas, set synchronization schedules, manage laptop users, or synchronize over the Internet or an intranet. Whether you'll find this tool useful depends on your particular circumstances. If the number of your replicas is growing, you might want to take a look.

Source code control tools: ODE includes a component that allows Access to connect with

Microsoft's Visual SourceSafe or any other source code control system that uses Microsoft's source code control API. The component allows access to the control

controls belong in a package with Visual Basic, whether VB5 or VBA. For the most part, they already come with VB5—why not with VBA as well?

Printed documentation: Two manuals, *Microsoft Office 97 Visual Basic Programmer's Guide* (500 pages, also available in bookstores as ISBN 1-57231-340-4) and *Building Applications with Microsoft Access 97* (700 pages) are tutorials, rather than references, and are thus very useful for novice developers, although they do assume some knowledge of Visual Basic. Full reference material is provided in electronic form, and the new IntelliSense features of Visual Basic help tremendously with syntax and constants. The most important book in the box, however (and the smallest at a mere 33 pages), is the *Microsoft Office 97 Object Model Guide*. (We'll discuss objects later.)

Sadly, no overview of ODE is provided. A few sections added to the object model guide to describe ODE's major components and to provide some guidance as to their use would have been helpful. Instead, superficial mentions are buried in various places in the Access manual. In some sense, the Access manual is the ODE manual, further suggesting that ODE is actually the new ADT.

ODE Tools Sampler: The ODE installer puts an icon on the desktop labeled ODE Tools Sampler. This piece of marketing fluff is not particularly helpful—it's actually a small subset from the Microsoft Developer Network. The ODE box says, "Use the latest technical information and code samples from the Microsoft Developer Network." The truth is that the information isn't current and the code samples aren't top-notch VBA.

ABOUT VBA

Visual Basic for Applications represents a seminal development in programming languages, perhaps the most important development since the IDE. It is not that VBA is the best programming environment. It is, simply, that VBA exists. Visual Basic is probably the most popular development tool, and now suddenly it comes in the box with the most popular application suite. While Microsoft publicly touts VB5, it delivers VBA by stealth. In some sense, we will become VB programmers whether we like it or not.

Having the same language underlying all Microsoft applications probably means that more people will give it a try. Just as Windows offers the advantage of learning one user interface for many applications, so VBA provides the benefit of learning one programming

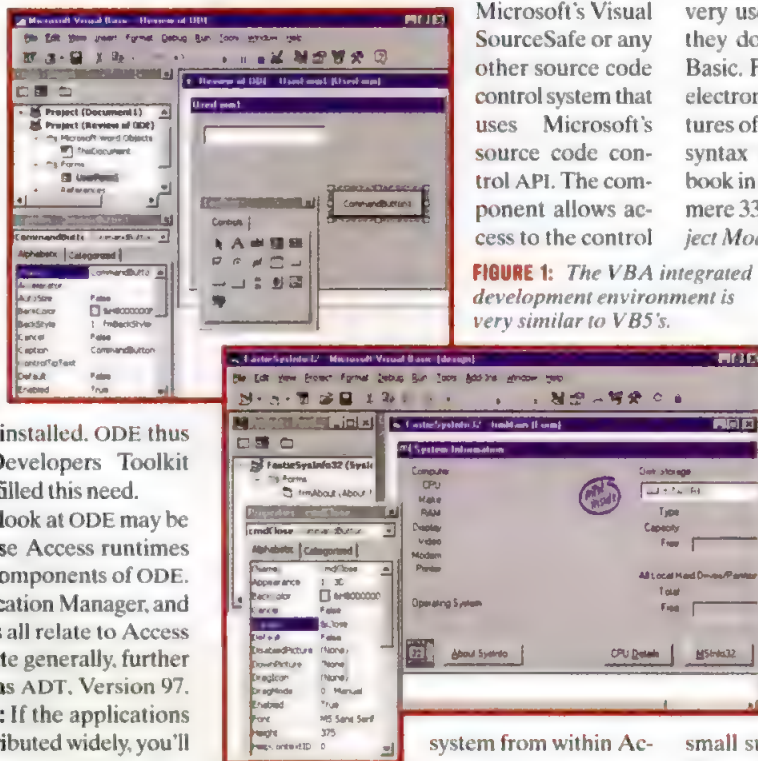


FIGURE 1: The VBA integrated development environment is very similar to VB5's.

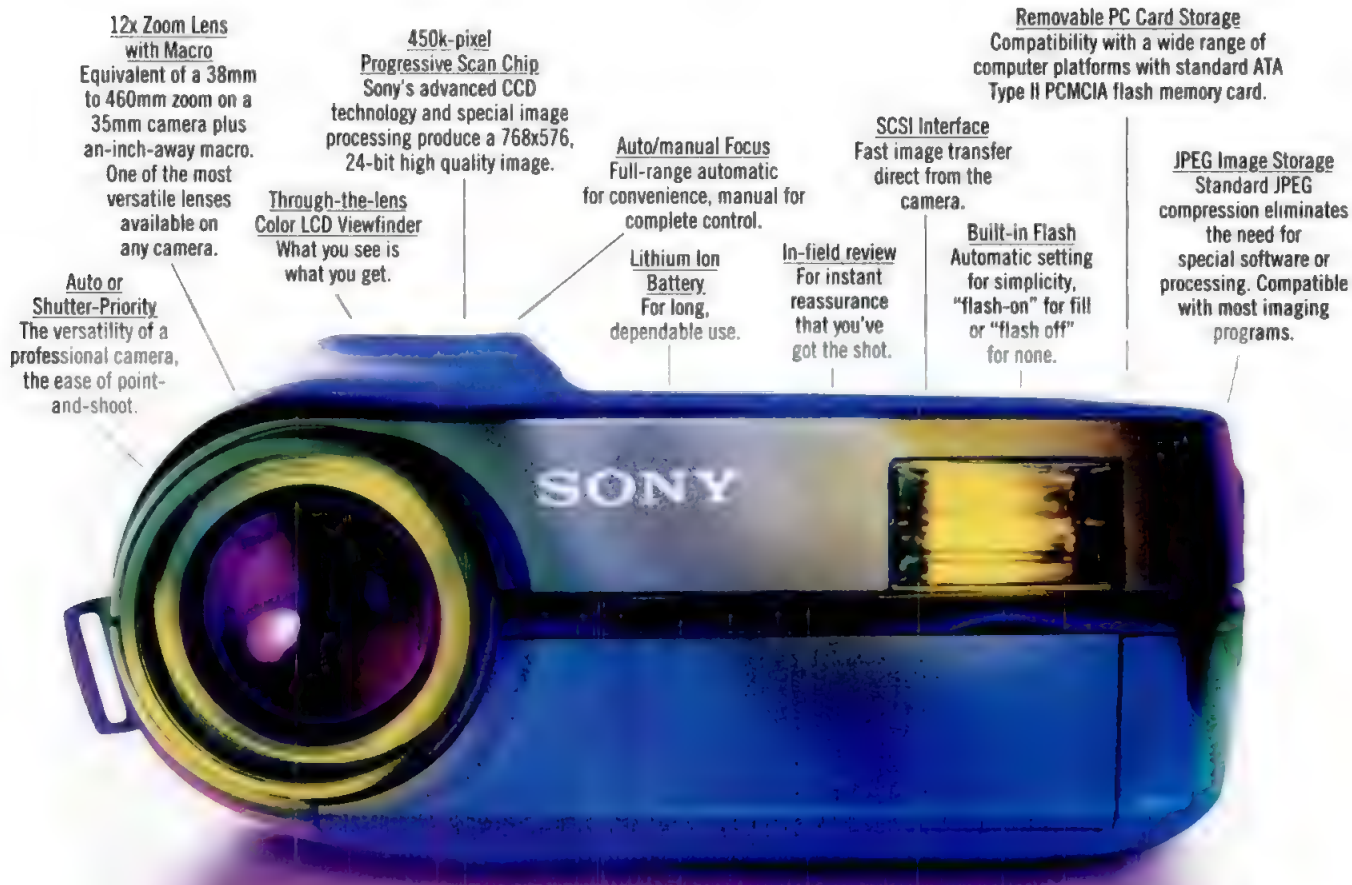
system from within Access, but you must purchase Visual SourceSafe or another system separately. If you have a control system, you need ODE to provide the component that enables access within Access.

It would have been more useful if the component provided integration with VBA rather than simply with Access. Perhaps more to the point, why would anyone plunk down the cash for SourceSafe, when it isn't fully effective without the addition of another component at additional cost? SourceSafe should come with whatever is necessary to make it work with Microsoft tools, or the tools themselves should come with the needed linkages.

ActiveX controls: ODE comes with a set of custom controls (now called ActiveX and usually identified by the file extension .OCX), such as the slider control and the rich text box control. If you're a VB5 developer, you'll have most of these already. If not, they do represent useful extensions to the VB development environment.

Here Microsoft has made a mistake. These

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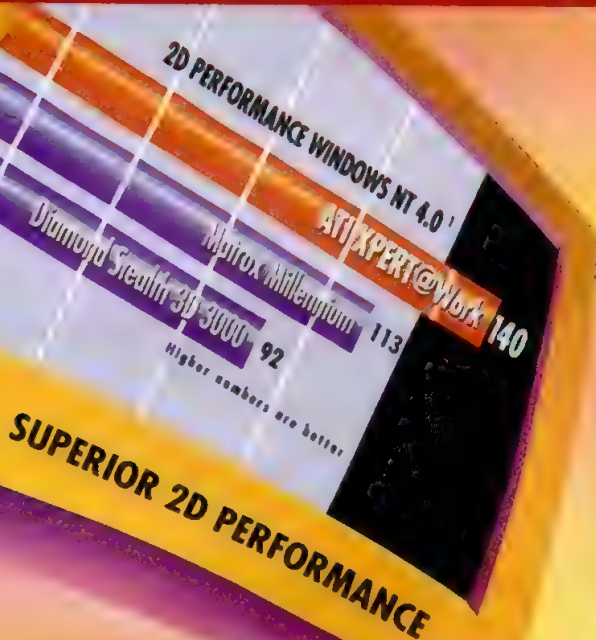
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environment for many applications. Microsoft has signed up about 40 other software companies that will be adding VBA to their applications; Visio Corp. hit the market first with VBA built into Visio Professional and Visio Technical, Version 4.5. Such third parties can be expected to market VBA aggressively because it does represent a significant advance to their products. And because VBA's real name is Visual Basic 5.0 Application Edition, it is actually a member of the VB5 family and thus engenders greater interest in the standalone tool. It's a marketing steamroller.

Putting VBA into an application means creating an object model for the application, so that VBA code can access the application's objects and manipulate them. For the Visio products, such objects might include a rectangle on a drawing as well as the drawing itself, and the object model exposes all of them.

Once an application has an object model

```
Sub MAIN
Count = 0
True = -1
searchtext$ = InputBox$("Please type a word to search for:")
StartOfDocument
EditFind .Find = searchtext$, .Direction = 0, .MatchCase = 0, \
.WholeWord = 0, .Format = 0, .Wrap = 0
While EditFindFound() = True
count = count + 1
RepeatFind
Wend
MsgBox searchtext$ + " was found " + count + " times"
End Sub
```

FIGURE 2: Counting occurrences of a word with WordBasic.

and VBA, it can become part of an application developer's arsenal. Suppose, for example, you want a program that can create kitchen layouts, then print parts diagrams and price lists. This application needs a database full of kitchen component information and some way to visualize the kitchen. How about Access and Visio? Just as you can write Office macros that operate Word and Excel, you can write VBA code to glue Access and Visio together. The

composite kitchen application could be thought of as Access with a drawing engine or Visio with a database.

VBA is a proper subset of VB5, but in fact VBA includes almost everything found in VB5. You must be conscious of the subtle differences (like running within Word as opposed to standing alone), but otherwise you write code the same way. The Office 97 object models are available as long as the owning application is running, so both VBA

and VB5 can get at them. As Figure 1 shows, the integrated development environment hardly differs from VBA to VB5.

ABOUT OBJECT MODELS

For a developer who has been building, say, Word macros for years, the notion of application objects is not new. What Office 97 and VBA/VB5 really do is standardize the object system in the Office applications. That sounds good, and in fact it does make for cleaner code with more consistent syntax and semantics. The object models can be very daunting, however, because they are not necessarily obvious.

Figures 2 and 3 show WordBasic and VBA code, respectively, taken from ODE's *VB Programmer's Guide*. Each represents the same functional piece of code for a tiny macro to count how many times a word appears in the current document. The key point of comparison is the statement that performs the search.

EditFind is the WordBasic statement; to Word users, it should be obvious that the statement is a concatenation of the menu commands necessary to start a search—in Word, the Find command is on the Edit menu. That's typical of WordBasic; its design is focused on matching syntactic elements to menu commands, so that recording macros is easy. This makes it easy to guess at the keyword for a particular Word operation you might want to code into a macro and thus makes it easy to search for information in the help file or manual. WordBasic is not a very elegant language, but you can usually muddle through.

For VBA, the equivalent statement is ActiveDocument.Content.Find.Execute. Find is the object, and Execute is one of its methods. The purist might find this more elegant, to be sure, but does it relate to anything at an intuitive level? No. Without question, one must become a student of the object model in order to gain proficiency as an Office programmer.

Suppose you were to record a macro to ini-

VBA or VB5?

If you are going to build a Visual Basic application that manipulates the Office 97 components, a logical question is whether to build with VBA or VB5. Here are some considerations.

- VBA comes with Office 97, so it does not entail additional cost.
- VBA is a proper subset of VB, so anything that can be done with VBA can be done with VB5.
- VB5 code can be compiled, while VBA code is always interpreted. The VB5 application may be considerably faster.
- VBA code runs in process, while VB5 code runs out of process and must access the Office application's object model via OLE interprocess communications. OLE overhead can be heavy to the point that the in-process VBA code runs faster, even though it is interpreted.
- VBA code can't run without a host application, such as one of the Office 97 programs or a VBA-enabled third-party product. VB5 code can be compiled to a standalone application, a DLL, or a control.
- Neither VBA nor VB5 can "see" the object model of an application unless that application is running. VB5 is always external to applications, so it must check whether they are running and perhaps start them. If you write VBA code from within a specific application, its object model is automatically available, but you will have to check for other applications.

If you're writing standalone applications that occasionally touch the Office object model, VB5 is the more powerful tool. If you're automating Office itself, VBA probably is the better choice. If you're a regular VB programmer, you'll end up using both.



tiate the Find operation in both Word 95 and Word 97 and then examined the macro code. In the first case, you'd find the EditFind statement, and as a Word user, you'd feel a connection with its context. In the second case, you'd find an objective statement with no obvious connection to the user context. That's why the object models must be learned, to understand them in context.

If you understand the object model, the VBA code in Figure 3 is cleaner, easier to read, and easier to understand. It's also more compact. The WordBasic code is 12 lines, while the VBA code without the With statement would be a mere eight. And note another subtle change: VBA loops around the Execute method of the Find object, while WordBasic loops around a RepeatFind statement after having initiated the search outside the loop.

VBA is a better language than WordBasic or the other application-specific macro lan-

```
Sub Macro1()  
Count = 0  
searchtext$ = InputBox("Please type a word to search for:")  
With ActiveDocument.Content.Find  
Do While .Execute(FindText:=searchtext$, Format:=False, _  
MatchCase:=False, MatchWholeWord:=False) = True  
count = count + 1  
Loop  
End With  
MsgBox searchtext$ + " was found " + count + " times"  
End Sub
```

FIGURE 3: Counting occurrences of a word with VBA.

guages, but there will be a more difficult learning curve. The good news is that once you've learned it, VBA offers more capabilities and greater power. It's a good trade-off, but it will surely frustrate casual macro developers—especially those who found WordBasic tough.

DO YOU NEED ODE?

The name Office Developer's Edition makes its purpose sound pretty clear. For those doing development work with Office, whether building macros or gluing the productivity applications together, ODE sounds

Visual Basic for Everyone

The inclusion of Visual Basic for Applications in Office 97 is extraordinary, although it isn't as sudden as it seems. VBA made its first appearance in Office 95 as the upgrade to Access Basic; in fact, Access programmers will probably be most comfortable with this newest version.

It's extraordinary, though, because one way to describe VBA is VB5 without the compiler. VBA is not just another macro scripting tool. Office 97's new "macro" language is a full-featured software development

promises associated with macro scripting tools simply aren't present in VBA; it's hard even to call VBA a macro language. For Word and Excel macro developers, the change is dramatic. For example, instead of editing a text file of WordBasic code and using the clumsy dialog editor to build forms, the full extent of Visual Basic's integrated development environment (IDE) is used. That represents a tremendous jump in development power and convenience.

The most obvious enhancement is the switch from the dialog editor to the full forms capability of VB. The dialog editor was horribly limited, even by the standard of the four-year-old VB3. Where before a dialog was limited to a very basic set of text boxes, check boxes, and buttons, now you can build a form using any control visible to VBA. That includes the standard suite of Windows controls, such as progress bars, list boxes, combo boxes, frames, pictures, and more. And if you own ODE or VB5, you can add to that a long list of custom controls, such as

the slider control and the rich text box, previously available only in the standalone version of VB. The VB aftermarket is huge, so you will find many custom controls you can add to your forms.

Many controls can be bound to data with VB and VBA, which means you can develop a program or macro to load and save the contents of the control automatically from and to an associated database. This is accomplished by setting a suite of data-related properties either manually at design time, without writing code, or under direct program control at run time. One of the data-bound controls is DBGrid, a spreadsheet-like control that can display multiple rows of data at the same time; it's a convenient way to build a database browser, and you can create it quickly, without programming.

NEW AND IMPROVED

The IDE itself is a major improvement for Office developers. In Word, for example, the macro IDE consisted of a toolbar, which appeared during

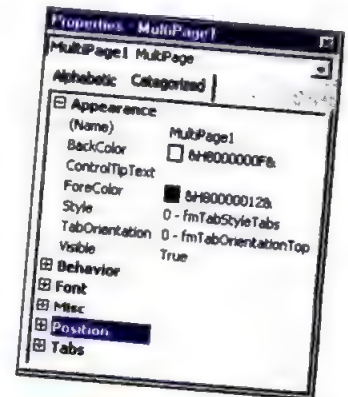


FIGURE B: The Property Inspector.

editing of WordBasic code, and the dialog editor. The VBA IDE, on the other hand, is the full-fledged VB5 IDE. The only elements missing are the commands and settings associated with creating standalone .EXEs, DLLs, and ActiveX controls, which only VB5 can do. That makes the IDE such an advance over the previous development environment in Office that it's hard to draw comparisons.

With a system as rich and complex as VBA, it's important to be able to find exactly what you need to accomplish a task without endlessly having to search a manual or help file. VBA's Object Browser, pictured in Figure A, is the first line of defense; it allows you to exam-

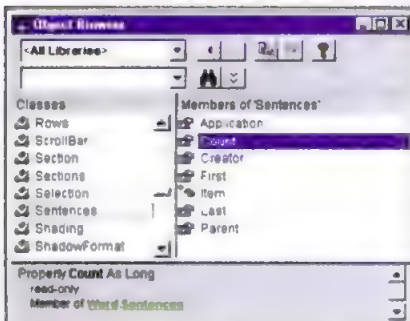


FIGURE A: The Object Browser.

tool that any VB4 developer would have been happy to take as an upgrade. The usual com-

like just the thing. Such developers might gain some benefit from the product, but in truth, the \$35 *VB Programmer's Guide* will suffice. If you are a VB5 developer, ODE is a waste of money, unless you really want the Replication Manager.

For Access developers, it's another story. To deploy Access applications to PCs that do not have Access, ODE is the new ADT and is thus a necessity. The good news is that it's a bargain.

ODE lists for \$799, as opposed to Office 97 Professional Edition's list of \$599. The differential holds on upgrade prices and street prices, so the true cost of the developer component is \$200. That's much less expensive than the old Access Developer's Toolkit, at a list price of \$495. Only one copy of ODE is needed to get the Access runtimes and license, if that's all you need. The differential makes sense as long as you're going to deploy a copy of Office 97 to the developer's desktop

anyway, and that's probably the case.

The bottom line is that ODE isn't a unified product with a clear value. It's a potpourri of applets, components, and documentation of mixed interest. For a corporate development staff, the extra cost is modest, so getting one copy to explore may be practical. But individuals and small development teams could make better investments elsewhere.

FURTHER READING

VBA is a rich and complex programming language sitting on top of a vast object model. Even if you are a professional programmer, this can be daunting. Here are some resources that might help.

Microsoft Office 97 Visual Basic Language Reference, Microsoft Press, 1997. ISBN 1-57231-339-0, \$129. A five-volume, 4,000-page reference set for programming in Office 97.

Mastering Microsoft Office 97 Development, a

Microsoft interactive training CD in the Mastering series, \$99. The Mastering series is an intermediate training tool.

Microsoft Access 97 Developer's Handbook, O'Brien, Pogge & White, Microsoft Press, 1997. ISBN 1-57231-358-7, \$39.99, includes CD.

Microsoft Jet Database Engine Programmer's Guide, Haught & Ferguson, Microsoft Press, 1995. ISBN 1-55615-877-7, \$39.95, includes CD. This is the essential reference to Jet and belongs on any serious Access or VB developer's bookshelf.

Microsoft Office 97 Visual Basic Programmer's Guide, Microsoft Press, 1997. ISBN 1-57231-339-0, \$34.99, no floppy disk or CD. This is the retail version of the book that comes in the ODE. □

Will Fastie is an independent consultant living in Baltimore who specializes in small-business automation.

ine every object visible in your particular environment. Here you can see a view of all class libraries, with the Sentences and its Count property selected. The Object Browser's bottom panel shows a quick summary of the

technique allows rapid access to any category of properties but keeps the list short and manageable. Property inspectors were a popular aftermarket addition to VB4; VB's fifth incarnation builds the improvement in.

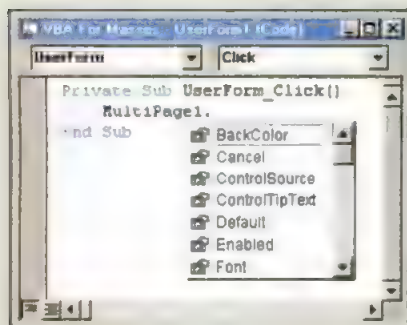


FIGURE C: IntelliSense syntax help.

property and offers links to the other components of the proper syntax (Word and Sentences). The context-sensitive help will describe the Count property.

One of the biggest improvements from VB4 to VB5—and available in VBA—is the Property Inspector, shown in Figure B. In VB4, all properties were listed alphabetically. With some controls having literally hundreds of properties, the list was long and cumbersome. Here we see VBA's categorized display, in this case for an instance of the MultiPage control. The outline

pop up over VB code while you are typing to provide a reminder about syntax and usage or to list available properties and methods. Microsoft dubs this IntelliSense, and it's the same feature used in the Office products to provide spelling tips and other information.

Figure C shows an example of IntelliSense's pop-up properties list for the MultiPage1 control. The pop-up appears when you type the period after the object name. You can select from the list or, if you prefer, just keep typing. As you type, the

closest match in the list is selected. Pressing Enter, Spacebar, or any punctuation key, such as a period, will enter the full name of the property or method.

The IntelliSense syntax tips are perhaps the most valuable improvement to the IDE. VB is a big language, with hundreds of objects, some having dozens of properties and methods, and no one can remember every detail. The tips save a tremendous amount of time by reducing the need to use the help file just to get syntax. The example in Figure D shows the syntax reminder that appears when you enter the Move method for the MultiPage1 control and type a space, then type a comma to indicate that you are omitting the first optional parameter. Left. Note that the optional Top argument is in bold, indicating that the next item you enter will be the Top parameter.

Finally, the enhanced debugger will prove exceedingly beneficial to Office developers.

Though the old Office debugger had a basic set of features and was certainly usable, this time around, you get the full VB debugger with its breakpoint and execution control features, the valuable immediate window in which a user can execute virtually any VBA statement, a watch window for observing the state of expressions or variables, and the new locals window, which displays local variables for the current procedure. VBA also includes VB's complete error-handling system, which combined with the debugger casts much greater illumination on a problem's source and solution.

Although VBA is a complex programming environment, it is probably the most approachable version of Visual Basic ever, with many features designed to keep programmers programming instead of reading manuals. There's lots to learn, but it's not painful, and your results will be worth the effort.

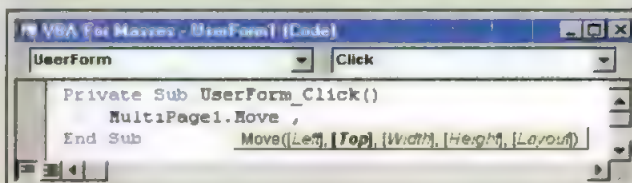


FIGURE D: The pop-up properties list for the MultiPage1 control.

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Saving the Internet from The Web

HTTP 1.1 and PNG are ready to come to the rescue of an Internet overloaded by Web traffic.

By Neil Randall

Once upon a time, when you thought of the Internet, you thought of speed. Speed for e-mail, speed for information, speed of delivery—these were its hallmarks, and such swiftness was a major element behind the huge growth in its popularity. But along came the Web, with its ability to serve up graphics and other multimedia elements, and as the bandwagon grew, “the Web” became “the Wait.” Worse still, the Web has managed to slow down the entire Internet, to the degree that proposals are in place to develop a new Internet (called Internet II) for the scientific and research community, with higher-speed connections and smaller user populations. That’s nice for the academics, but it leaves most of the Net’s users right where they are today, swimming in a sea of Web-clogged glue.

Fortunately, the architects of the Web are far from oblivious to the problems. The W3 Consortium (www.w3.org) and the Internet Engineering Task Force (www.ietf.org) are working to pass several proposals that would increase the Web’s efficiency. One of these, Cascading Style Sheets (CSS1), seeks to solve part of the problem of slow graphics transfer by building far greater page layout capability into HTML itself, thereby eliminating the need for page designers to use graphics for everything from fonts to spacing. CSS’s cousin, Dynamic HTML, takes the idea a step further by making the appearance of Web pages changeable within the browser, removing the need to access the server across the Net for all changes.

Both of these technologies have already been covered in the PC Tech section of *PC Magazine* (November 19, 1996, Internet Tools, “Cascading Style Sheets,” and July 1997, “Dynamic HTML: More Client, Less Server”), so this time we’ll focus on two more forms of relief, PNG and HTTP 1.1. PNG, the Portable Network Graphic format, is de-

signed to render graphic images more quickly and with higher quality than the two currently popular formats, GIF and JPEG. Much more significant, however, is HyperText Transfer Protocol (HTTP) 1.1, a reworking of the Web’s mechanism, designed to ease network congestion by reducing the number of connections required between client and server.

PNG: BETTER QUALITY, BETTER SPEED

Graphics lie at the heart of the popularity—and problems—of the Web. On one hand, they make the Web visually appealing, especially in an age of graphical computing, and they offer designers a means of attracting visitors. But those same graphics have almost single-handedly created the World Wide Wait as we know it, with the bulk of most Web documents consisting of in-line graphics, graphical hyperlinks,

mated graphics and for progressive display (also called interlacing). JPEG (Joint Photographic Experts Group) is the second format supported by virtually all Web browsers and is best known for its *lossy compression* technique, whereby it compresses files extensively with a small loss of data. The problem with the JPEG format is that lossy compression can result in low-quality graphics. The trouble with GIF is more complex: Its supported compression technique, LZW (Lempel Zev Welch), is under patent by Unisys Corp., and Unisys and CompuServe demand royalty fees for its use. That means that GIF is not, in fact, a free specification.

While the developers of PNG could have rewritten the GIF specification to use an unpatented compression technique (or at least one that requires no licensing), they decided to design something brand-new instead—which let them solve other problems with GIF and JPEG at the same time. For example, while GIF images use a palette of no more than 256 colors, PNG supports True Color images. True Color uses 8 bits each for red, green, and blue intensity—allowing over 16 million different shades. This allows more precise control over images’ palettes, resulting in higher-quality color. Furthermore, PNG

lets each pixel be assigned an alpha value representing its degree of transparency or opacity. In contrast, pixels in GIFs are either completely transparent or not transparent at all.

Also, PNG images are rendered as full-size but coarse images, rather than on a line-by-line basis as with interlaced GIF images, and are thus more quickly readable than GIF images. They can be read up to eight times as quickly, in fact. The first pass of a PNG image renders $\frac{1}{64}$ of the total pixels, as opposed to $\frac{1}{8}$ with GIF, accounting for the speed gain. And tests show that even text in a PNG image can be read after 25 percent of the image is transmitted,

whereas 50 percent of a GIF image must be transmitted before text is readable. A PNG image map might very well be usable after the first pass, so that you spend less time waiting for it to download—since it’s rarely necessary to see an entire image map, or even a completely clear rendition of it, before deciding where to click on it. Everybody seems to agree that PNG is a good idea, but it’s not at all clear when the major browsers will implement it. Usually, however, standards set by the W3C get

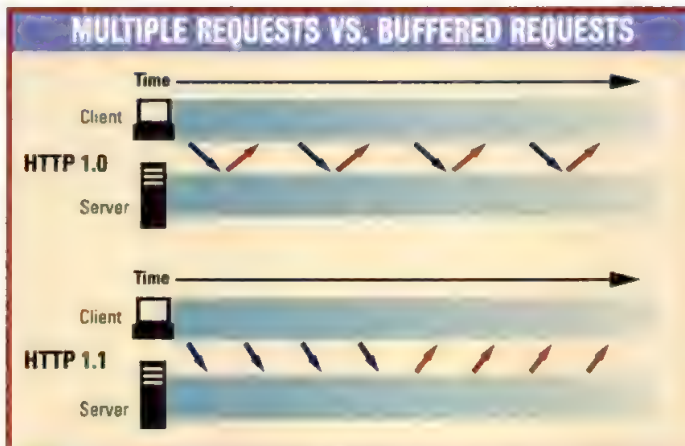


FIGURE 1: This diagram shows the difference between the HTTP 1.0 method of multiple requests and the HTTP 1.1 method of buffered requests sent together across an open connection.

bullets and lines, and complex image maps. These things take time to download, and with hundreds of thousands of users downloading millions of images at the same time, the Web’s bandwidth congestion is easy to understand.

The majority of Web documents use two types of graphics formats: GIF and JPEG. GIF (Graphics Interchange Format) was developed by CompuServe in 1987, and it has come onto the Web predominantly as GIF89, which includes capabilities for transparent and ani-

incorporated into browsers in their next major releases, and in all likelihood we'll see PNG supported by Navigator and Internet Explorer by Version 5.0 at the very latest.

HTTP 1.1

One thing you have to say about the HTTP developers is that they're modest. The first version of the protocol was number 0.9, and since early in the Web's popular history (since 1995), we've been using the Web through HTTP 1.0. Now, despite a number of extremely important enhancements—including one that fundamentally changes the nature of the Web's basic request/response transaction—the number of the proposed newest version is a mere single decimal point higher. Hardly seems right, somehow.

What does seem right is what HTTP 1.1 promises to achieve. Essentially, it strives to reduce the time needed to access Web pages—not by using the anticipatory read-ahead system employed by such packages as Peak NetJet, nor by improving the caching already available in Web browsers, but rather by drastically improving a few key elements of HTTP through having it work more efficiently with the Internet's primary protocol, TCP/IP (typically shortened to TCP). To date, HTTP and TCP have worked together, but not as efficiently as possible. The fundamental problem is this: TCP reaches full data-transfer efficiency only when the connection between client and server is kept open, but the current HTTP insists on closing it after each request.

HTTP works on a request/response basis. When you click on a hyperlink, HTTP opens a TCP connection with the server and requests particular data. The server then responds, and it closes the connection when the request is satisfied. Simple enough, but efficient with at most a few transactions per Web document. But in the case of a document with multiple graphics or other multimedia elements, the efficiency is hindered. Each element requires a separate request and thus a separate connection. If the Web document contains ten separate graphics files, for example (and many have more), at least 11 TCP connections occur, one for the document itself and one for each graphics file. Watch the status bar on your browser the next time you click into such a site and you'll see these separate connections taking place.

HTTP 1.1 attempts to solve the two main problems that result from Version 1.0's approach. The first problem is that establishing each connection takes time (and we're all aware that connection attempts aren't always successful), and what's more, each HTTP request must wait for a response before the next request can be sent. HTTP 1.1 deals with this

issue by allowing *persistent* connections—that is, TCP connections that remain open for multiple requests. In the example above, a single connection could handle all 11 requests, closing only when the final request was fulfilled. Current Web browsers and servers will have to be updated to take advantage of this feature, however. A browser will have to include a tally of all requests when it makes the initial connection, and the server must understand that it is not to close the connection until after sending the data for the last request.

The ability of a browser to send multiple re-

HTTP 1.1 strives to
reduce the time needed to
access Web pages
through more efficient
interaction with TCP/IP.

quests without waiting for a server response is known as *pipelining*. Requests are buffered and then sent together over the connection. Figure 1 shows the difference between the HTTP 1.0 method of multiple requests and the HTTP 1.1 method of buffered requests sent together across an open connection.

The other problem with HTTP 1.0's approach is the size of packets transferred in a typical connection. All data on the Internet is transferred in packets across TCP connections, and packets can vary from 1 byte to several kilobytes; 576 bytes is used as a standard lowest common denominator, to avoid packet fragmentation (since different networks handle different-size packets), but much larger packets are increasingly common. The inefficiency comes in when an HTTP connection transfers only a small packet—as often occurs, because Version 1.0 does not allow persistent connections. Since a single TCP connection can handle larger packets or numerous smaller ones, its capacity is barely approached. In contrast, by allowing the TCP connection between browser and server to remain open, HTTP 1.1 can take advantage of the full packet capacity of TCP/IP (with no increase in bandwidth), thereby ensuring maximum efficiency by reducing the total number of connections.

There's a third significant issue for HTTP 1.1 to resolve, and in its implementation of persistent connections, it will do so. The process of accessing a Web document is delayed initially not by HTTP itself, but by the Internet's domain name system. Because we like to type

memorable addresses more than numbers—for example, we prefer *microsoft.com* to 207.68.137.53 (the actual Internet Protocol address)—we rely on a translation system to resolve these addresses into their corresponding IP numbers. The domain name system works through a series of servers and resolvers to make this happen. But all of this takes time: Most Web documents use the domain name for URL addressing, both externally and internally (each URL refers to a domain name rather than an IP number), and HTTP 1.0 must resolve the name with each request. The persistent connection in HTTP 1.1 allows proper caching of the current domain name, eliminating the need to look up the IP number for each request.

HTTP 1.1 offers even more relief for the congested Internet, again with regard to domain names and IP numbers. Using the host's request header, HTTP 1.1 can make requests of multiple Web servers from a single IP address, simplifying the Web administrator's life considerably. The protocol will not deviate from the older requirement of one IP address per server—a policy that also conserves IP numbers (which are in dwindling supply because of the Web's popularity).

Not incidentally, the Internet's naming authorities will be able to reclaim the numerous IP numbers that exist solely for allocating domain names to multiple servers. This move won't happen immediately, however; first, older HTTP versions must no longer be used, and both browsers and servers must fully support the host's request header element.

The whole point of HTTP 1.1 is to make the Web more efficient. Persistent connections, Portable Network Graphics, Cascading Style Sheets, and Dynamic HTML limit the number of connections necessary to download Web documents and the amount of data to be downloaded. Initial tests (described at www.w3.org/pub/WWW/Protocols/HTTP/Performance/Pipeline.html) suggest time savings of 30 percent or more with persistent connections and pipelining only, and the other technologies will increase that savings further. Better yet, the Internet as a whole will be less clogged, because fewer packets will be trying to pass through the TCP/IP connections.

In all likelihood—as with all traffic solutions—the number of users will increase, so that those of us already there will not save time overall. But that's the fault of human behavior, not of technological design. □

Neil Randall is a frequent contributor to PC Magazine and the author of *The Soul of the Internet (ITCP)* and *Special Edition Using Microsoft FrontPage (Que)*. He can be reached at nrandall@sprynet.com.

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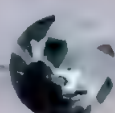
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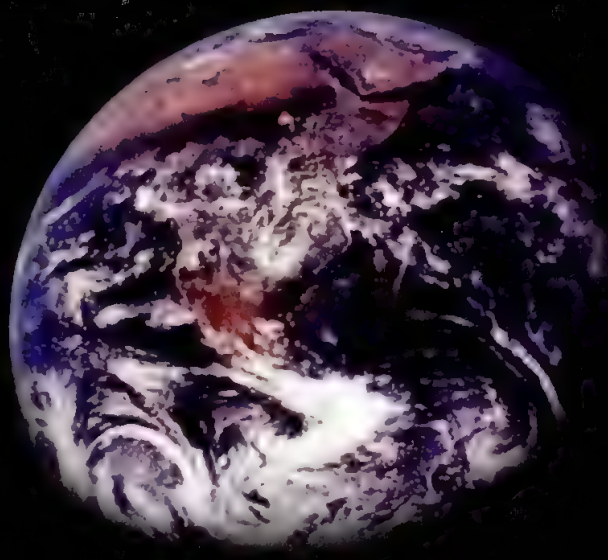
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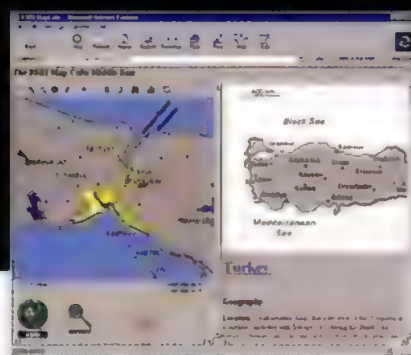
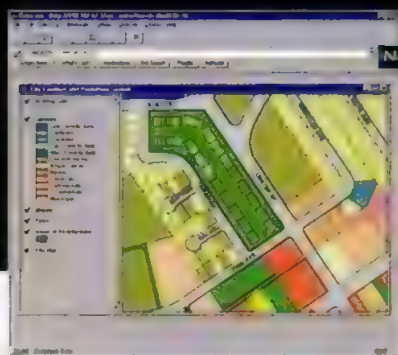
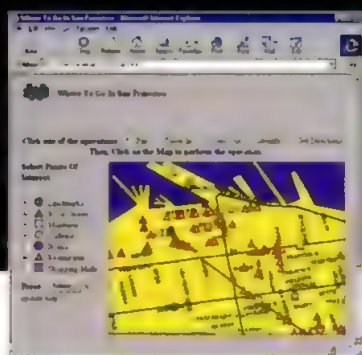
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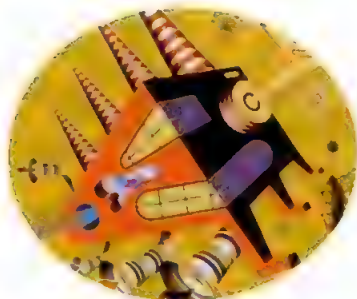
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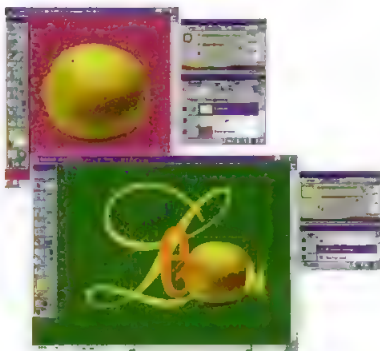
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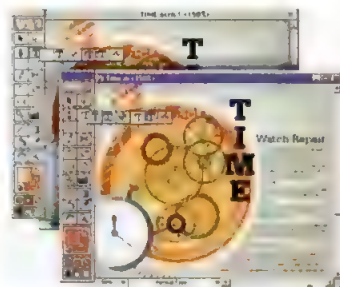
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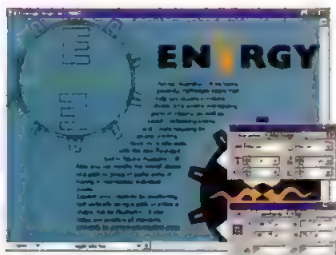
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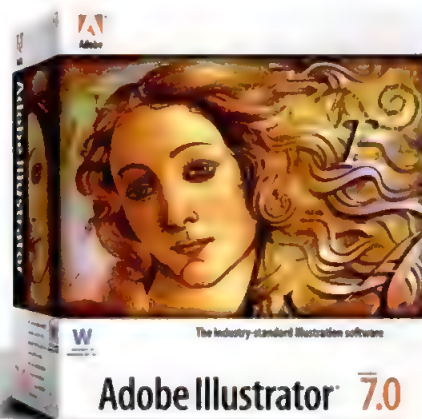
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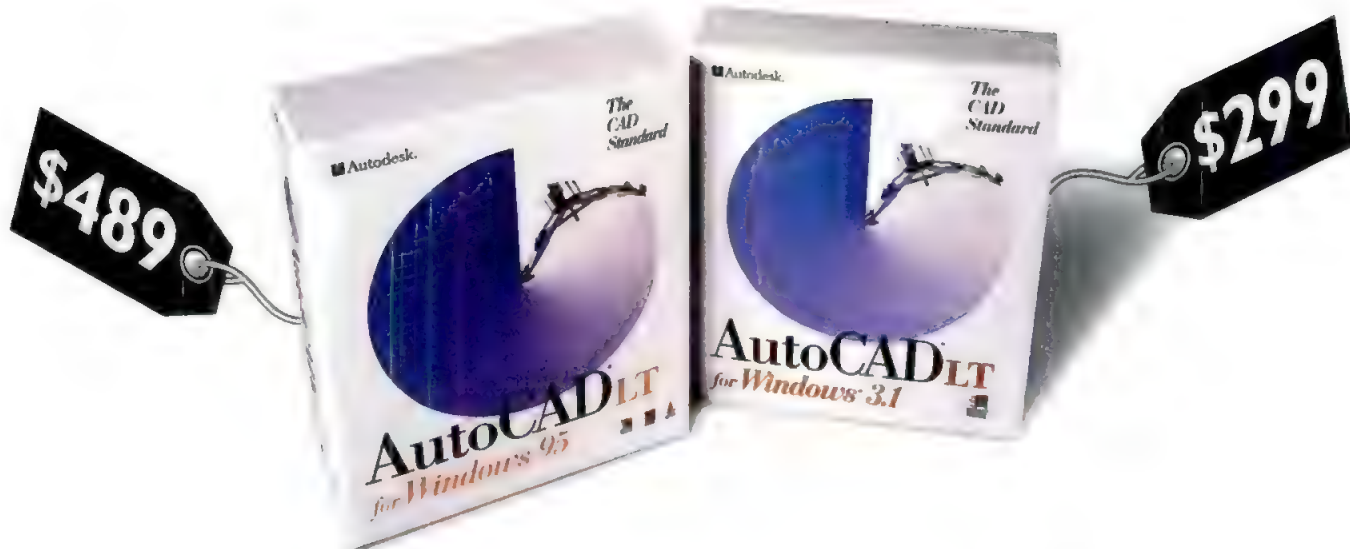
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CIRCLE 221 ON READER SERVICE CARD

Getting the Most out of Linux

Learning Linux isn't easy, but its power and customizability make it worth the effort.

By Neil Randall

We began our exploration of Linux, the free Unix clone that runs on PCs, in the last column. We looked at how to acquire Linux and how to install it. This time we'll start with a brief stroll through the operating system, and then we'll discuss the installation and configuration of Linux's graphical interface, XFree86. A free distribution of the popular X Window system, XFree86 extends Linux's capabilities in the same way Windows made DOS more powerful. If you run Linux, you'll want X as well.

BASIC COMMANDS

If you think back to the first time you stared at DOS's `C:>` prompt, having no idea what to do, you'll get some idea of what it's like to tackle Unix for the first time. The prompt may be different—depending on the shell you use, you'll get a `$` or `%` or some other symbol—but the idea is the same. Like DOS, Unix just sits there waiting for you to do something. That might mean loading a program, manipulating files, or configuring your system. In the case of Unix, it can also mean performing a baffling activity called “building a new kernel.”

That's not to imply that Unix is similar to DOS in the extent of its capabilities. Linux outstrips DOS thoroughly, particularly in its file security, its multiuser capabilities, and its built-in networking. But the tasks you had to perform in DOS, particularly file and directory management, must be performed in Unix as well. If you know how to do such things in DOS, you won't have much trouble in Unix.

Figure 1 shows some of the basic Unix commands. Notice that the column containing DOS commands is called *DOS counterpart*, not *DOS equivalent*. That's because there are substantial differences between the Unix and DOS versions of specific commands. For the

most part, Unix commands have far more *switches* (options) available than their DOS relatives, and more are added as users demand them. More importantly, however, Unix is designed from the ground up as a multiuser, networked system, so commands like `chmod` and `chown` are crucial for security.

The commands in Figure 1 will help you get through your first Linux sessions, but don't be surprised if you encounter difficulties. You'll find that some programs don't appear to be

into Unix and the X Window System, Unix users are becoming somewhat more helpful to newcomers. Posing a question in a *comp.os* newsgroup no longer arouses the kind of hostility toward new users it once did, and Unix people will actually discuss the differences among Unix, Windows 95, and Windows NT (which is Unix-like in many ways). A brief anecdote will show how this new attitude differs from only a few years ago. In 1993, while maneuvering through my Unix account as a rank beginner, I went into a directory and deleted the wrong file using `rm`. I called a Unix veteran to ask if I could do anything, and he said I was out of luck. I could have turned on the interactive mode of `rm` with the `-i` switch, but I didn't know that. I said it would make sense to have interactive mode on by default, and he replied—quite contemptuously—“If you didn't want the file deleted, you shouldn't have typed that!”

Clearly, the discussion was over.

UNIX COMMANDS

Command	DOS counterpart	Action
<code>ls</code>	<code>dir</code>	Displays information about files and directories
<code>cd</code>	<code>cd</code>	Changes the current directory
<code>cp</code>	<code>copy</code>	Copies files to another directory and/or filename.
<code>mv</code>	<code>move/rename</code>	Moves a file to another directory, or renames it.
<code>rm</code>	<code>delete/erase</code>	Removes a file.
<code>mkdir</code>	<code>mkdir</code>	Creates a new directory
<code>rmdir</code>	<code>rmdir</code>	Deletes a directory.
<code>man</code>	<code>help</code>	Displays the manual page (help page) for a requested command
<code>more</code>	<code>more</code>	Displays a given file, pausing at the end of each screen
<code>cat</code>	<code>type</code>	Displays the contents of a file.
<code>grep</code>	—	Displays the lines in a file that match a given pattern.
<code>chmod</code>	<code>attrib</code>	Sets permissions on files and directories
<code>chown</code>	—	Changes the ownership of the specified file(s)
<code>df</code>	<code>dir</code>	Displays the amount of free space on the disk.
<code>find</code>	—	Locates and displays files that match given criteria.
<code>wc</code>	—	Provides count of words or characters in a file.

FIGURE 1: Here are some of the basic Unix commands and their DOS counterparts. Note that Unix commands generally have many more switches available than DOS commands, despite their similarities.

doing anything and others have very strange command systems with no menus to help you along. The text editor `vi` is one; you might expect to load it and just start typing, but it doesn't work that way. Instead, you have to press the letter `i` for insert mode, then start typing. And when it comes to saving the file, Unix programmers like the more accurate term *write*, and they create their user interfaces accordingly. Other peculiarities—at least from a DOS perspective—abound. Manual pages might be meant as help files, but they're usually far too detailed to be truly helpful. And be careful when you use the `rm` (delete file) command. Unix offers no undelete option, so your file is gone forever.

As more and more users make their way

UNIX DOES WINDOWS

The X Window System, variously called X Windows, X Window, or just plain X, is the primary graphical interface available for Unix. Developed at MIT, the X Window project became sufficiently popular to merit the formation of the X Consortium, with a member list including IBM, DEC, MIT, and other computing leaders. The current version of X is X11R6 (version 11, release 6), and the version of X11R6 that comes with Linux is called XFree86. Like Linux itself, XFree86 is different from other versions because it was designed to run on the Intel 386

(and above) processor. The XFree86 copyright is held by a nonprofit organization called the XFree 86 Project, which works with the X Consortium to ensure frequent and timely updates to the XFree86 system.

Unlike Windows 95 or NT, X Windows separates the base system and the windowing system. In fact, the base system, called an *X server*, does little beyond providing the environment necessary for a graphical user interface. The actual objects you see on the X desktop, including everything from icons to toolbars to buttons to menus, come from a program called a *window manager*. Think of the window manager this way: If you could completely replace your Windows 95 desktop with a different system of managing UI ob-

PCTech Operating Systems

jects and window designs, with only the core OS components running underneath, you'd be closer to the X Window model.

The most popular window manager is called *fvwm*, which is a stripped-down recasting of *twm*, the powerful but memory-hungry window manager that comes with X11 prop-

probably had to change the partitions on your hard drive, and in some cases you've had to answer some extremely specific questions about hardware components, such as your CD-ROM drive. But those difficulties are nothing compared with the ones you might encounter configuring X. Thankfully, organizations like Red-

Hat and Caldera make it as painless as possible, but in other distributions the process can be a true nightmare.

The problem is almost always the video system. Linux isn't bad at autoprobing for hard disks, CD-ROMs, and sometimes even network cards, but you have to set up the video components yourself. That means you'll need information about your video card and your monitor, and with some distributions, the information gets extremely detailed. Recently I installed the latest Caldera and RedHat distributions. Both contained direct sup-

port for my Number Nine 9FX Motion 771 card, but I had to know my monitor's refresh rates and resolution capabilities before proceeding (see Figure 3). If you have an obscure or unsupported video card, you might have to configure its settings on your own, and that can be not only time-consuming, but dangerous as well. An older monitor that doesn't support multiple refresh rates can be damaged if the operating system feeds it the wrong information. You should have your technical information ready and be sure to underestimate, rather than overestimate, your equipment's capabilities. If you can afford it, start with a call to your equipment's tech support department.

The video system isn't all you have to worry about. As the initial setup screen (Figure 3) for XFree86 shows, you must detail your mouse and keyboard types as well. Keyboards are rarely a problem, but there's no guarantee your mouse will work. Furthermore, the XFree86Setup program asks you to choose not only the type of mouse, but also its Unix device number and baud rate, though once you specify the right kind of mouse (you're pretty safe if you have a PS/2, Microsoft serial, or Logitech mouse), the other items mostly work with the default settings. Getting past that rather daunting screen is often the worst hurdle. Still, for most people, the setup screen is easier to deal with than configuration files that ask

for clock speeds, card and chip types, and all that other information you wondered about in your card's and your monitor's manuals.

Once you have X Window up and running, the next question is what can you do with it. The answer is, quite simply, just about everything. True, X won't run your copy of *Tomb Raider* (although Windows 95 emulators, such as *WINE*, are under development), but programmers have churned out thousands of valuable packages for X over the years. You can run Netscape Navigator, Corel WordPerfect Unix, Web servers such as C2Net's Apache-based Stronghold (Apache is by far the most commonly used Web server on the Internet), and any number of terminal programs, HTML editors, graphics applications, and utilities—most of them free. You can also run *Doom*, which has been available in an X version almost as long as it's been around for DOS.

The combination of Linux and XFree86 offers a rich, powerful, and complex operating system with excellent scalability and constant new development. But be prepared for a lot of initial study and a lengthy courtship. At first, you may find yourself back in Windows more than in Linux, and you may wonder at times why you're using an entire disk partition for an operating system you rarely touch. Eventually, though, you'll spend more and more of your time in Linux. The fact is, together Linux and X let you build a system suited precisely to your needs and to your network, with freely available development tools at your disposal. You need a lot of time to learn Linux well, but you'll find the time is well spent. □

Neil Randall, a frequent contributor to PC Magazine, is the author of The Soul of the Internet (ITCP) and coauthor of Special Edition Using Microsoft FrontPage 97 (Que). You can e-mail him at nrandall@watarts.uwaterloo.ca.

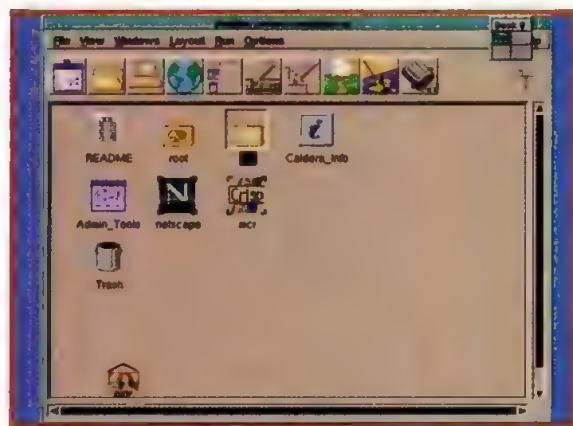


FIGURE 2: The popular window manager *fvwm* gives XFree86 a very attractive three-dimensional appearance.

er. Other window managers include *mwm* (the Motif manager) and *olwm* (Sun Microsystems' Open Look interface), but *fvwm* has captured a large share of the market. It gives XFree86 a three-dimensional appearance, keyboard shortcuts for all menu items, color icons, and a set of programming extensions that let you customize the system thoroughly, an important consideration among Unix's many power users. You can see *fvwm* in Figure 2, and an attractive interface it is. X Window was developed around the three-button mouse (unlike Windows' two-button and the Mac's one-button standard), and since clicking each button gives you a different drop-down menu, you have better control over the programs and the environment than with Windows or the Mac. In fact, the biggest problem you're likely to have with XFree86 and *fvwm* is that once you're used to them, Windows starts to look and feel rather plain.

INSTALLING AND CONFIGURING XFREE86

Getting used to X isn't a problem, but getting it up and running in the first place may well be. Typically, you install X from the CD-ROM or FTP site from which you installed Linux itself. In RedHat 4.1 and Caldera OpenLinux Base, the installation is more or less automatic. It's one thing, however, to copy a system's files onto your hard disk and quite another to make them work with your hardware. That's where many would-be Linux users give up.

If you've committed yourself to setting up a Linux/X machine, you've already worked pretty hard at configuring your system. You've

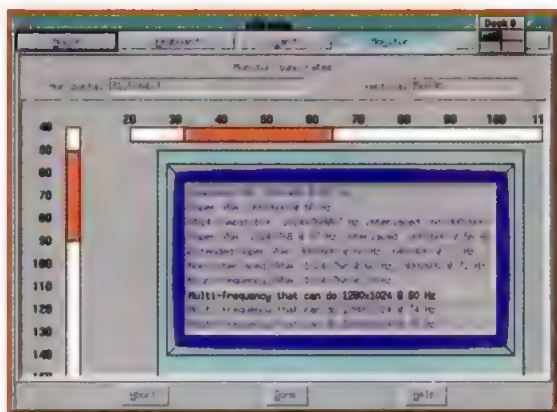


FIGURE 3: XFree86's initial setup screen can be pretty daunting, as it requires you to specify a lot of information about your hardware.

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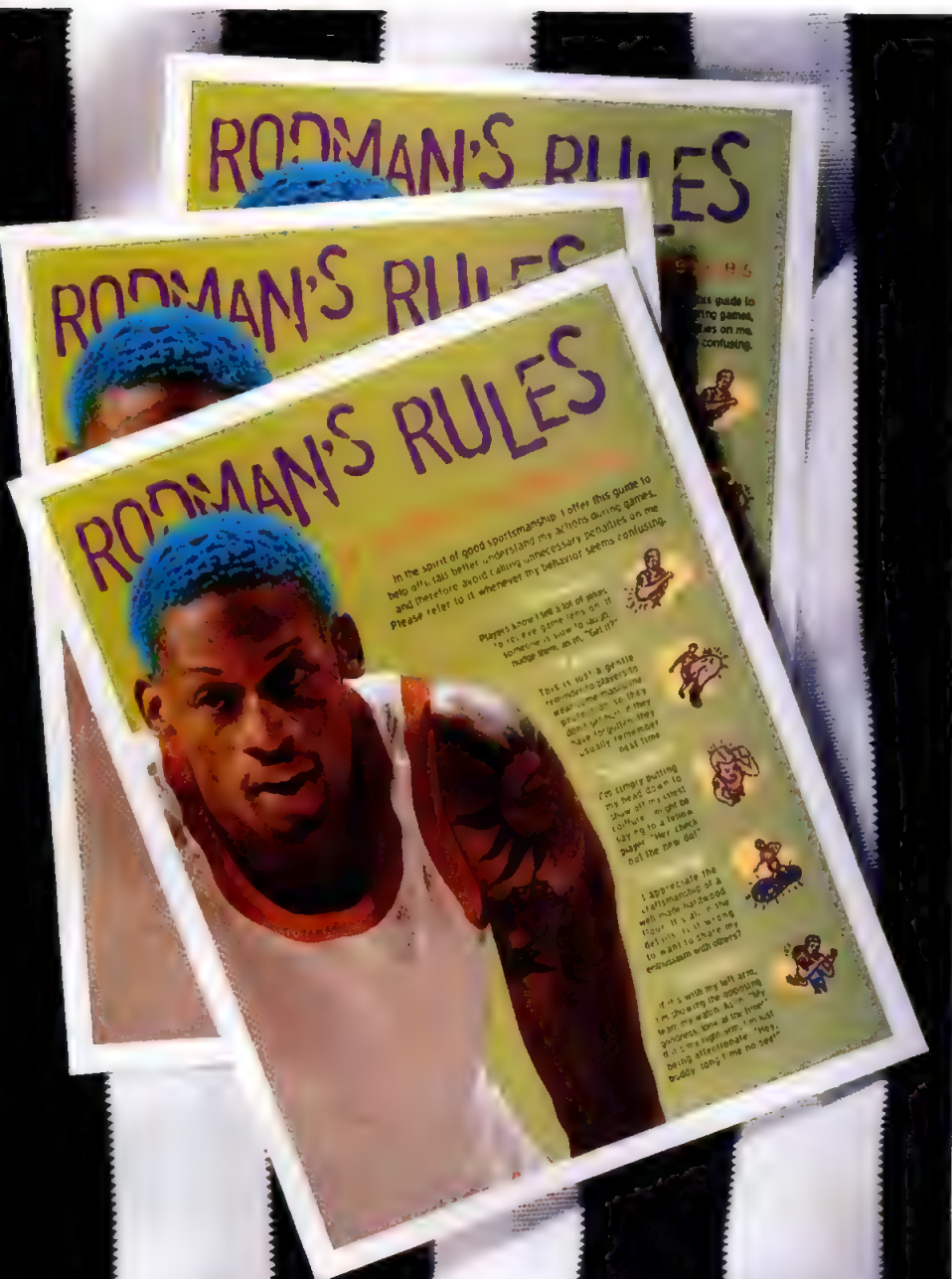
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VRML Brings 3-D Worlds To the Web

Virtual worlds are growing on the Net. Here's how they work and how to enter them.

By William R. Stanek

The term *virtual reality* conjures up images of movies like *Lawnmower Man* and *Johnny Mnemonic*, where at some point you are whisked off to a rich computer-generated 3-D landscape. But such landscapes are no longer relegated to the domain of science fiction. Using VRML (Virtual Reality Modeling Language), you can experience a form of virtual reality for yourself, and the experiences can be put on the Web for the world to enjoy in living 3-D. Virtual reality is not a new idea: People have been fascinated with the concept for decades, and some of the most forward thinkers of our time have spent those decades trying to bring virtual reality to life.

WHAT IS VRML?

VRML is an outgrowth of strong interest in virtual reality and 3-D modeling technologies. Yet bringing virtual reality to the Web was a major undertaking. In late 1993, while the rest of the Internet community was eagerly downloading Mosaic and heading out into two-dimensional cyberspace, a group of forward thinkers was already considering how the Web could be transformed by virtual reality. These forward thinkers put their heads together at a meeting in March 1994. An objective of the meeting was to launch an effort to create a virtual reality modeling language for the Web.

VRML (often pronounced "VERmal") became a buzzword on the Net. By October 1994, the draft specification for VRML 1.0 was ready to be presented to the world. By May 1995, the VRML 1.0 specification was already in its third and final draft. What Mark Pesce, Tony Parisi, Gavin Bell, and the other authors of VRML created was the first 3-D modeling language for the Web.

VRML BASICS

What VRML brings to the Web is the capability to render complex 3-D images using simple instructions. Like HTML, VRML is designed to be platform-independent and extensible and to use limited network bandwidth. VRML 1.0 does this with a language

based on Silicon Graphics' Open Inventor File Format, which the authors of VRML 1.0 chose because it is a versatile ASCII-based format for rendering 3-D objects. Defining 3-D objects in terms of ASCII characters was the key to ensuring that anyone who wanted to use or create VRML documents could.

Although VRML was developed to be independent of HTML, VRML depends on the same protocols used to transfer files across the Internet. Thus, everything you learned about the Internet and the Web also applies to VRML. You access VRML documents with a VRML browser or an HTML browser with a VRML add-on module. The URL for a VRML document looks just like that for an HTML document—except for the extension. An HTML document uses the .htm or .html extension and a VRML document uses the .wrl, .wrz,

your PC, using text-based instructions that define polygonally rendered objects and special effects for lighting, ambience, and realism.

VRML documents are just text, but the worlds they represent, when rendered by VRML browsers, are entirely graphical. The only text in a VRML world is represented as an object or within a VRML image. The VRML 1.0 specification concentrates on how 3-D scenes are rendered in cyberspace. The intent was to create an easy-to-use solution that, like HTML, would be enhanced over time. Consequently, VRML 1.0 included only the most basic facilities for linking VRML objects and scenes.

Beyond the static realm of VRML 1.0 is the moving, interactive realm of VRML 2.0, aptly nicknamed "Moving Worlds." The interactive nature of VRML 2.0 comes from its ability to use programmable behaviors, and VRML 2.0 also opens the door to sound and video file formats. Incorporating these innovations into VRML 2.0 meant the developers had to invent a new way of creating 3-D worlds, and although the result is truly wonderful, VRML 2.0 is not backward-compatible with VRML 1.0. But despite the disadvantages of having to switch modeling languages as well as tools, most developers have wholeheartedly embraced VRML 2.0.

WORKING WITH VRML

The objects described by VRML code are called *nodes*. You can use built-in node structures to create 3-D objects such as cones, cylinders, cubes, and spheres. Once you define a shape for an object, you can easily add texture, lighting, camera effects, and object transformations. Nodes can also be nonspatial code blocks, one example of which we'll see in a moment.

Programmable behaviors and event tracking are the key ingredients that make VRML 2.0 worlds interactive. You move through the 3-D Web in the VRML browser using visual controls—usually a set of arrows—that you nudge with the mouse or keyboard. And with some browsers you can even steer with a joystick. When you approach a

node programmed with a behavior, the node comes to life using animation techniques. Behind the scenes, the animated node is routing an event (such as your approach), which is detected by a proximity calculation, to another node, which handles the event. I'll

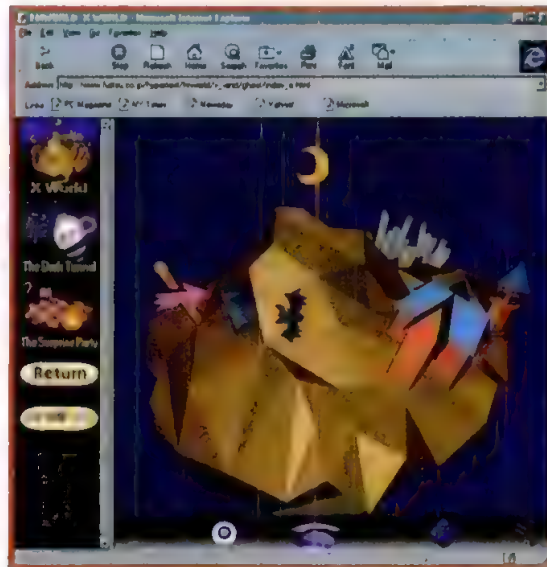


FIGURE 1: Cosmo Player is an example of a VRML 2.0 browser plug-in, here displaying Fujitsu's XWorld in the right-hand frame. What you can't see is that the bat is flying around in motion allowed by VRML 2.0.

or .flr extension. These extensions are used to identify VRML documents called *world* files.

The power of VRML is that you no longer need a \$50,000 workstation or a \$5,000 graphics application to build 3-D models. VRML enables you to create complex 3-D scenes with

VRML BROWSERS

Name	Available for Windows 95	Available for Windows NT	Plug-in mode	Supports VRML 1.0	Supports VRML 2.0	Selling points	System requirements	Download from
Cosmo Player 1.0	✓	✓	For Internet Explorer 3.0 or Netscape Navigator 2.0 or later.	✓	✓	Most comprehensive support; fully implements both VRML 1.0 and 2.0; supports scripting with VRMLScript and Java.	Pentium with 16-bit graphics; 16MB RAM recommended.	vml.sgi.com/cosmoplayer/
Liquid Reality 1.0	✓	Pending	For Internet Explorer 3.0 or Netscape Navigator 3.0.	✓	✓	Great interface; many developer extensions for scripting with Java; Java-based approach makes for cross-platform solution.	8MB RAM, JDK 1.02, 16-bit/32-bit graphics.	www.dnx.com/products/lr/download/
Live3D	✓	✓	For Netscape Navigator 2.0 or later.	✓	✓	Supports GZIP compression for faster data retrieval; adaptive rendering also speeds up display.	Pentium; 8MB RAM recommended.	www.netscape.com
WIRL 2.0	✓	✓	For Netscape Navigator 2.0 32-bit, Netscape Navigator 3.0 32-bit, or Internet Explorer 3.0.	✓	✓	Rendered some scenes faster than the competition.	486 or better with math coprocessor; 8MB RAM.	www.vram.com/3d1.html

* Requires the Netscape Navigator 4.0 version of Live3D

FIGURE 2: A comparison of VRML browsers and their features.

call this node the *event handler*.

For the event handler to do its job, it needs to understand the concept of time. Programs written for a single hardware platform can rely on the system's clock for timing, but VRML worlds run across many platforms. You tell nodes in a VRML world about time in the real world using a time sensor, which is a special type of node that sends a time feed to other nodes. Using the time feed, you can program the relative position of an object to change at a specific rate and thus animate an object.

Another way to make the world more interactive is to associate a touch sensor with a node. Any time the virtual reality representation of the user, or Avatar, contacts or runs into a node with a touch sensor, an event occurs. By changing the appearance of the node or performing some other action when the event occurs, you get a sense that the world is indeed interactive.

Although simple animation tricks and touch sensors have their place in VRML worlds, advanced behavior and true interaction are achieved only through scripting and the scripting node. When you think of scripts, you probably think of scripting languages like JavaScript. While you can certainly use JavaScript for VRML scripting, the scripting node doesn't prevent you from using actual programming languages. In fact, more often than not, Java is used to script VRML worlds. VRML developers like to use Java because it is a robust Internet-ready programming language and, more importantly, most major VRML vendors support Java in their development tools and browsers.

You may also have heard of VRMLScript—a subset of JavaScript supported directly by VRML 2.0. While VRMLScript doesn't enjoy the widespread popularity of JavaScript, the scripting language is quite useful, especially because it is designed specifically for VRML worlds.

Like HTML pages, VRML worlds are interconnected using hyperlinking. These links are what enable you to wander the 3-D Web and move easily from world to world.

GETTING READY TO BROWSE IN 3-D

Browsing the 3-D Web is getting easier every day, especially when you consider that the most popular Web browsers are now packaged with VRML add-ons. Netscape Navigator comes with Live3D, and Internet Explorer features a VRML add-on called VRML Support. Both add-ons let you view virtual reality worlds without installing additional software. But Navigator's and Internet Explorer's VRML browsers are not necessarily the most advanced or capable ones.

Netscape has packaged Live3D with Navigator for some time now, but unless you have the latest and greatest version of Navigator, you are stuck in the realm of VRML 1.0. Specifically, Live3D for Navigator 2.0 and 3.0 is a VRML 1.0 browser, whereas Live3D for Navigator 4.0 is a VRML 2.0 browser.

Microsoft makes VRML Support available as a download for Internet Explorer. VRML Support for Internet Explorer 2.0 and 3.0 is a VRML 1.0 browser. With Internet Explorer 4.0, a new add-on that supports VRML 2.0 is under development and should eventually be

packaged directly with the browser.

The best place to find VRML resources, such as browsers, is the VRML Repository (www.sdsc.edu/vrml), which is an independent resource sponsored by the San Diego Supercomputer Center. Follow the Browser and Plug-ins link to find a VRML browser you can use.

Searching for the perfect VRML browser for your computer and operating system isn't always an easy task. If you want to be able to access VRML sites within the familiar context of your traditional Web browser, look for a VRML plug-in for your current browser or a VRML browser that doubles as a plug-in. (Figure 1 shows a plug-in VRML browser.) If running a separate program to browse VRML worlds is more to your taste, there are plenty of standalone VRML browsers available.

For Windows 95 and Windows NT, there are about 20 VRML browsers. To make it easier for you to find the right one, I put these browsers through the paces of a rigorous test. The result is a list of what I consider to be the best VRML browsers available. These browsers and their features are summarized in Figure 2.

The columns headed *Available for Windows 95* and *Available for Windows NT* are fairly self-explanatory. One concern I had was that most of the vendors did not differentiate between Windows NT 3.51 and Windows NT 4.0. And although a beta version of Liquid Reality for Windows NT is available, there was a problem with the browser's ability to update the screen reliably, which meant I really couldn't use it.

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Plug-in mode refers to the VRML browser's ability to run as a plug-in within a traditional Web browser. The compatibility references are those listed by the browser developer and verified for this article. Because Internet Explorer 3.0 and 4.0 have a plug-in compatibility mode, most plug-ins that run in Navigator Version 3.0 or later also work in Internet Explorer Version 3.0 or later. Also note that both Internet Explorer 4.0 and Netscape Navigator 4.0 are recent releases; browser updates sometimes cause problems with plug-in compatibility.

The columns on the chart headed *Supports VRML 1.0* and *Supports VRML 2.0* are also fairly self-explanatory. Only the Cosmo Player professed compatibility with both VRML 1.0 and VRML 2.0, and indeed Cosmo Player does work well with both VRML 1.0 and VRML 2.0.

Selling points sums up the features that made the browser stand out from the crowd. Although all the browsers listed had many selling points, I described only what I considered the most important.

System requirements includes the browser vendor's system recommendations as well as actual requirements. Regardless of the recommendations or requirements, you will want to shut down other running applications before you wander the 3-D Web on a PC. You'll probably also want to invest in a modem that's at least 28.8 Kbps.

Download from is the URL of a Web page that will let you download a trial version of the browser. Note that Live3D is packaged with Netscape Navigator.

After you install a VRML browser or plug-in, blast off to Silicon Graphics' comprehensive search engine for 3-D Web sites (vrml.sgi.com). This Web site lets you search the 3-D Web using keywords.

SUMMING IT ALL UP

VRML opens the door for many exciting uses of 3-D modeling on the Web. Lack of support for moving and interactive 3-D graphics was an important shortcoming in the original VRML 1.0 specification, but VRML 2.0 quickly remedied this, making the 3-D Web a truly exciting place to browse. □

William R. Stanek is the executive director of Global Internet Solutions and author of several books, including Web Publishing Unleashed, FrontPage 97 Unleashed, and Peter Norton's Guide to Java Programming. His seventh book from Sams.net, Netscape ONE Developer's Guide, was published in April. You can contact him by e-mail at director@tvpres.com.



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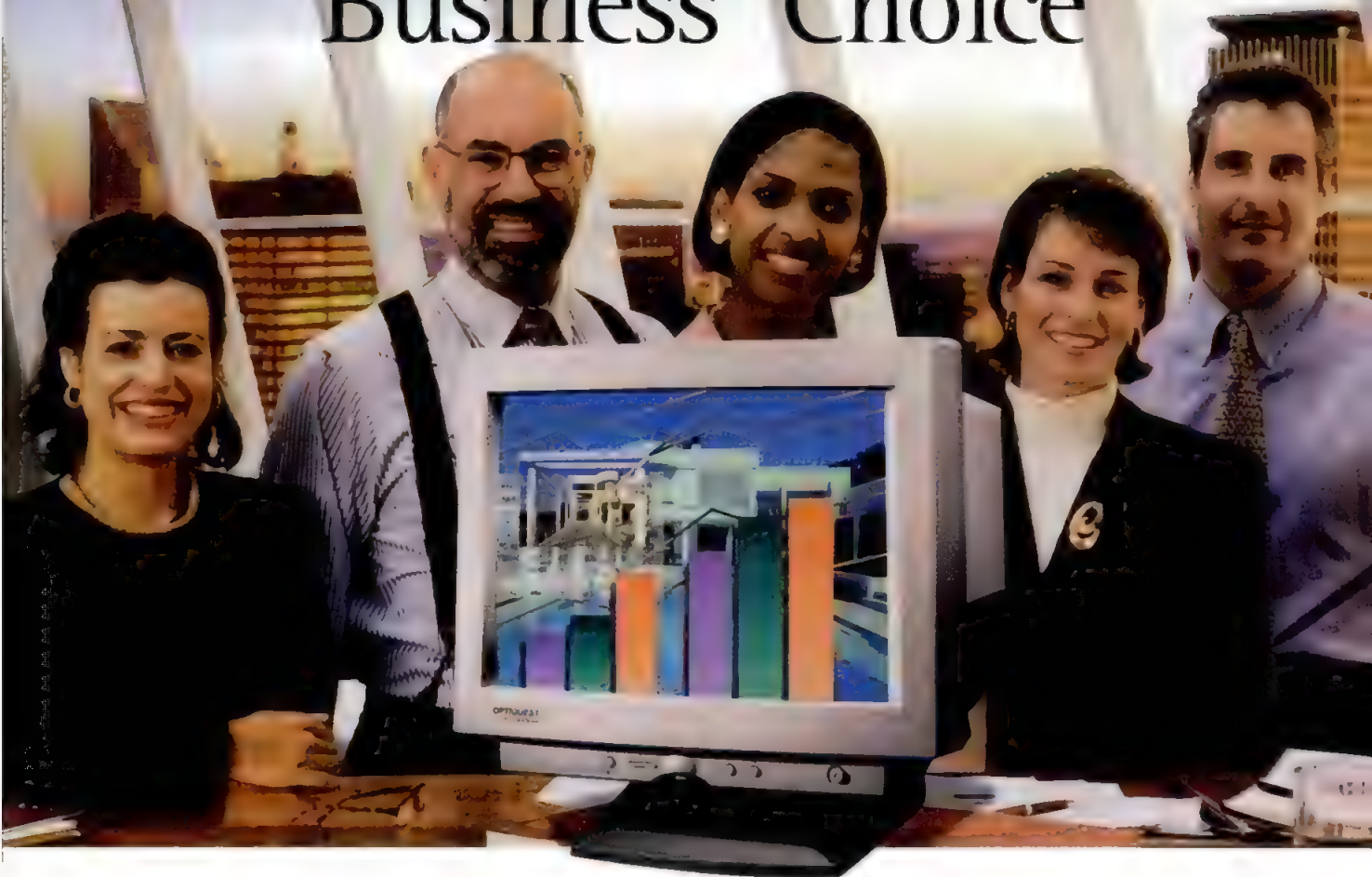
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Virtual Desktops for Windows 95 and Windows NT

ZDDesk enables fast switching among groups of applications to reduce Taskbar clutter.

By Steven E. Sipe

Windows 95 and Windows NT 4.0 let you run many applications at the same time and quickly switch among them using the Taskbar. But the more programs you run, the harder it is to locate them on the Taskbar, because it truncates the program names to save space. An efficient solution to this problem is a set of virtual desktops. If you could create groups of related programs on their own desktops and quickly move among them, the clutter problem would be immediately solved. For example, you could devote one virtual desktop to communications programs, a second to programs you are using to create a document with embedded graphics, and so on. Another benefit of virtual desktops is that you can quickly hide evidence of running programs—though of course we realize that no reader of *PC Magazine* would be running entertainment software at work.

This issue's utility, ZDDesk, runs under Windows 95 and Windows NT 4.0, and it lets you set up from two to nine different virtual desktops and switch among them with a mouse click. Moving applications from one desktop to another is a cinch, and you can have selected applications appear on all desktops. Virtual desktops can use different-color backgrounds so they are immediately recognizable, and you can also give them names to make it easier to remember what applications are grouped there.

You can obtain ZDDesk by downloading it from PC Magazine Online or by mail. Refer to the sidebar "Getting the Files" for details. The source code for ZDDesk, which was written in C++ with the Microsoft Foundation Classes (MFC), is also provided for those interested in seeing how it works.

RUNNING ZDDESK

To install ZDDesk, copy its three program files (Zddesk.exe, Zddesk.cnt, and Zddesk.hlp) to a subdirectory on your hard disk. Run Zddesk.exe, and its icon will appear in the system tray area on the right or bottom area of the Taskbar (see Figure 1). The ZDDesk icon consists of a monitor that displays the number of your current virtual desktop; you can quickly shift to a new desktop by clicking the left mouse button on the icon. When you switch desktops, you will notice that all of the programs on the current desk-

ZDDesk

ZDDesk lets you group programs on virtual desktops. This approach lets you run a number of applications without cluttering the Taskbar and also affords some privacy, since it lets you quickly switch desktops.



top disappear and the new desktop's programs appear. If you run a program on the new virtual desktop, ZDDesk will associate it with that desktop and activate it each time you switch to the desktop again. As you switch around to each new desktop, you will see the applications that you have started while that desktop was selected.

If you decide that you no longer want to run ZDDesk, you can close it by choosing Exit from its context menu. This will close ZDDesk and move the running applications

on each of the virtual desktops to the usual Windows desktop.

Some of Windows' system utilities may produce unexpected behaviors. For example, if you display the Display/Properties screen in the Windows Control Panel and then switch to another desktop and try to do the same thing, the Display/Properties screen will not appear. This is because the screen is configured so that you can display it only one time, and it is currently running on the previous desktop. If nothing seems to happen when you try to start a program, check to see whether it's already running on another desktop.

Another point to remember is that programs that often lock up may affect ZDDesk's ability to change desktops. This is because a locked-up program cannot process the messages that are sent to it. If you use a program that is prone to frequent lockups, use the Arrange screen's "Keep on all desks" option (see below) to keep the offending application visible at all times.

CONFIGURING ZDDESK

ZDDesk offers several configuration options. You can access them by right-clicking on the ZDDesk icon in the system tray to bring up its context menu. The first few entries list all of your virtual desktops. You can use this list to navigate directly to a particular desktop.

ZDDesk also allows you to have unique background colors for each desktop. To change the background color, use the usual Windows Control Panel Display/Appearance option. Then switch to the second desktop and do the same, this time choosing a different color. The program saves this information in the Registry, and it will automatically restore the colors the next time you run ZDDesk. Of course, you won't see the background color if you're using screen-filling desktop wallpaper.

You can also customize desktop characteristics by choosing the Properties context menu item. The Properties screen (see Figure 2) lets you define a unique name for each of ZDDesk's virtual desktops. This name will appear on the ToolTip associated with the ZDDesk icon in the system tray, and it will also

FOR PROGRAMMERS ONLY ZDDesk is a 32-bit Windows application written in Microsoft Visual C++ and uses the Microsoft Foundation Classes (MFC). The full source code for ZDDesk is available from PC Magazine Online and demonstrates the following programming techniques:

- enumerating top-level windows using the Win32 EnumWindows API function and a static callback routine;
- performing drag-and-drop operations between the common tab and list controls;
- saving and restoring desktop background colors.

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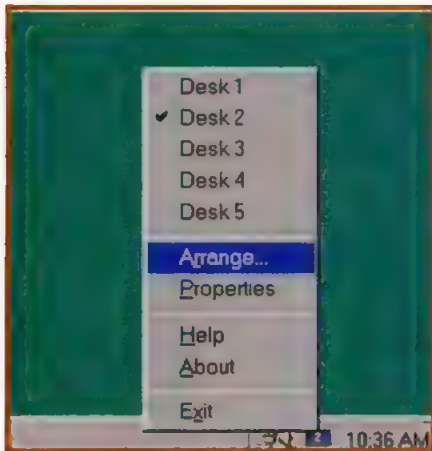


FIGURE 1: ZDDesk's icon in the Taskbar's system tray shows the number of the active desktop. Right-click on the icon to display the program's context menu.

appear on the context menu in the list of desktops. To change the name of a particular desktop, left-click on the desktop's edit field. The numbers next to each of the edit fields represent the desktop numbers (from one to nine). Type the new name, then click the OK button; the new name will immediately become active and will be displayed when you

bring up the context menu. The names you choose are stored and are reused the next time you load ZDDesk.

The Properties screen also allows you to configure the number of virtual desktops. This number can be anywhere from two to nine. To change the number of desktops, left-click on the buttons in the Count spin control.

There are a couple of points to keep in mind when decreasing the number of desktops. First, you can't decrease the number below that of the active virtual desktop. In other words, if you are currently on desktop number three and you try to decrease the desktop count to two, ZDDesk will display an error message warning you that you can't remove the current desktop. Second, you can't remove desktops that currently have windows displayed on them. For instance, if you are running the Windows Calculator on desktop five and you try to decrease the desktop count to four, ZDDesk displays an error message saying that you can't remove a desktop if it is not empty.

ARRANGING WINDOWS

Another useful configuration option on the ZDDesk context menu is the Arrange item. Selecting it brings up ZDDesk's Arrange screen (see Figure 3), which allows you to move applications from one desktop to another and to indicate that an application should be visible on all desktops.

Suppose that you are running WordPad on desktop number one and Paint on desktop two and decide that you would like to

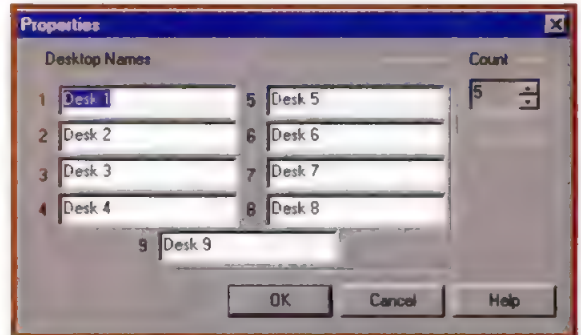
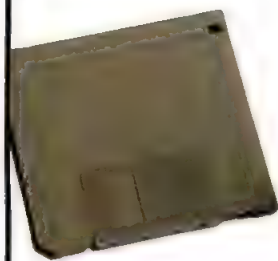


FIGURE 2: The Properties screen lets you customize the name of each virtual desktop and set the number of desktops to use.

have them both on the same desktop. You could accomplish this by closing one of the applications and starting it on the appropri-



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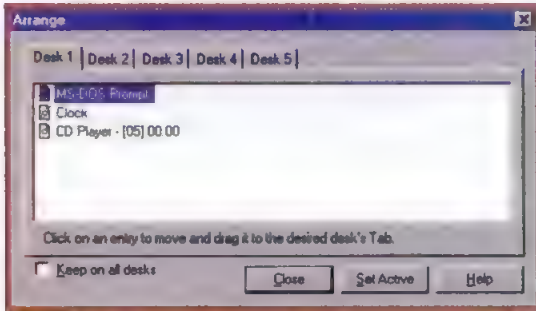


FIGURE 3: The *Arrange* screen is where you move applications from one desktop to another. You can also indicate that a particular application should appear on all desktops.

ate desktop, or you could let ZDDesk do the work for you.

To run WordPad on desktop two, all you need to do is click the Desk 1 tab on the Arrange screen and select WordPad in the list of running applications (its entry changes to a highlighted color when you select it). Next, hold the left mouse button down and drag WordPad up to the Desk 2 tab. As you move the mouse, you'll notice the cursor change to a rectangle when you are over a valid desk tab, and to a circle with a slash through it when you are not over a valid tab. Once you have positioned the cursor over the new desktop's tab, just release the left mouse button and the application will move to the new desktop. To verify that the move was successful, click on the Desk 2 tab and locate the application in the list of running programs.

Another useful feature of the Arrange screen is the Set Active button. By using it, as with the context menu, you can immediately switch to the virtual desktop whose tab is currently selected. This lets you view different desktops while arranging windows.

ZDDesk also allows you to keep specified applications visible on every desktop by checking the "Keep on all desks" box on the Arrange screen. Once you select this option, the selected program's list icon will have a green check mark on it, and the program will show up in each desktop's list of running applications. If you decide later that you no longer want this program to be visible on every desktop, then you can again select it in the list and click on the check box. The application will disappear from all of the virtual desktops except for the one that is currently active.

INSIDE ZDDESK

ZDDesk is a 32-bit Windows application written in C++ with MFC. It can be compiled with Microsoft Visual C++ 4.x or higher. ZD-

Desk's source code shows several interesting programming techniques, including enumerating top-level windows, performing drag-and-drop operations between the common tab and list controls, and saving and restoring desktop background colors.

ZDDesk maintains virtual desktops by keeping a list of all of the visible top-level windows (a top-level window is an application's main window) contained on each desktop. It shows these windows only when the corresponding desktop is active. It is very important to

keep in mind that ZDDesk maintains a list only of visible windows. There are quite a few hidden tasks running in Windows that we wouldn't want to disturb.

A top-level window also controls the visibility of other secondary windows, such as dialog boxes. When you call ShowWindow(SW_HIDE) on the top-level window of an

application, Windows hides not only the main window but also any secondary ones that the application is currently displaying. The inverse happens when you call ShowWindow(SW_SHOW) on the main window: Windows shows the main window and any secondary ones.

ZDDesk uses the Win32 API call EnumWindows to obtain a list of all of the current top-level windows. The code in Figure 4 shows the EnumWindowsAPI call and the callback routine that ZDDesk uses to retrieve information about each window.

The callback routine is a static method member of the CZDDeskFrame class. Windows calls this method and provides two pieces of information as parameters. The first parameter is the window handle (HWND) of the top-level window. The second parameter is the user-defined LPARAM value passed in the EnumWindows call. In my example code, I pass the class's this pointer as the LPARAM value. I pass the class pointer because the callback needs to be a static routine in order

```
// Tell Windows to call our callback routine with information on each top
// level window
::EnumWindows(EnumCallback, (LPARAM) this);
...
// The EnumWindows() callback routine:
// Gets the window's handle and the class's this pointer
BOOL CALLBACK CZDDeskFrame::EnumCallback(HWND hWnd, LPARAM lParam)
{
    CZDDeskFrame *pThis = (CZDDeskFrame *) lParam; // Get the this pointer
                                                    // passed via EnumWindows
    pThis->SaveWnd(hWnd);                          // Pass the window handle to ZDDesk's
                                                    // SaveWnd member function
    return(TRUE);                                  // Tell Windows to continue the
                                                    // enumeration
}
```

FIGURE 4: The CZDDeskFrame object passes its own this pointer to the EnumWindows API function, making the pointer available to the EnumCallback function.

```
TC_HITTESTINFO tcHit; // Tab hittest structure

tcHit.flags = TCHT_ONITEM; // Tell HitTest() to look within
// the entire area
// of the tab
tcHit.pt = pMsg->pt; // Get the mouse location (from
// WM_MOUSEMOVE)
m_Tab.ScreenToClient(&tcHit.pt); // Convert the location to the
// tab's client area
int nDropDesk = m_Tab.HitTest(&tcHit); // Get the tab number
...
```

FIGURE 5: The tab control's HitTest method makes it easy to determine the tab onto which a dragged item was dropped.

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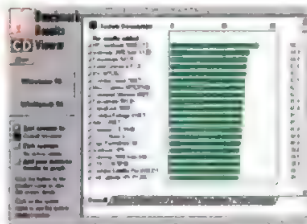
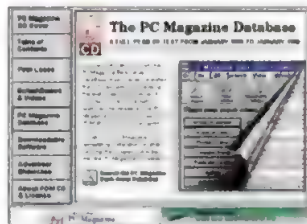
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```
// Get the current desktop's background color (from a COLORREF array entry)
m_aclrDesk[m_nCurrDesk] = ::GetSysColor(COLOR_DESKTOP);

...
// Set the new desktop's background color (to a COLORREF array entry)
int nColor = COLOR_DESKTOP;
::SetSysColors(1,&nColor,&m_aclrDesk[m_nCurrDesk]);
```

FIGURE 6: Saving and restoring the background color is handled with calls to *GetSysColor* and *SetSysColors*.

for Windows to call it, and static routines don't automatically get the hidden this pointer for the class that contains them. Passing the pointer as an LPARAM is a simple way to associate the callback method with a class without having to resort to global class pointers.

If you examine the callback method, you will see that it calls the *SaveWnd* method, which does the actual work of maintaining ZDDesk's list of active windows. It first checks to make sure that the window is not a "special" one that shouldn't be hidden—for instance, the main desktop, the Taskbar, and so forth. It then verifies that the window is currently visible. If the window meets these criteria, its window handle is added to the window list for the current desktop, and then it is hidden. Once all of the top-level windows are enumerated, the *SwitchDesk* method is called to switch to the new desktop. *SwitchDesk* goes through the window list for the new desktop and makes each window visible.

DRAGGING BETWEEN COMMON CONTROLS

ZDDesk's code also demonstrates how to select an item in the common list control (the *CListCtrl* class in MFC) and drag it to a common tab control (the *CTabCtrl* class in MFC). This is done by intercepting the *WM_LBUT-*

TONDOWN and *WM_MOUSEMOVE* messages to determine when a list control item is being dragged. The *WM_MOUSEMOVE* handler determines whether the cursor is over a valid drop tab and sets it as either a "drop" or a "no drop" cursor, based on where it is located.

The *WM_MOUSEMOVE* code determines whether a drop location is a valid tab in a three-step process (see Figure 5). First, it gets the cursor's location in screen coordinates from the *WM_MOUSEMOVE* message. It then converts the screen coordinates to the tab control's client coordinates. Finally, it calls *CTabCtrl::HitTest* to see whether the provided coordinates lie within a tab. *CTabCtrl::HitTest* returns either the number of the valid tab (zero or greater) or a number less than zero if the cursor is not over a tab.

SAVING BACKGROUND COLORS

In addition, ZDDesk's code shows how to determine and set the current desktop's background color and how to save and restore that information using the Registry (see Figure 6). It uses the Windows API call *GetSysColor* to save a desktop's current background color each time the desktop is replaced by another one. When the desktop becomes active again, its background color

is restored using the Windows API function *SetSysColors*.

Setting unique background colors for each desktop is a good way to distinguish between them easily, but you wouldn't want to set these up each time you started ZDDesk. That's why ZDDesk writes its current colors to the Registry. This ensures that the selected desktop colors will be restored each time you run the program. ZDDesk stores its persistent data in the Registry key *HKEY_CURRENT_USER\Software\PC Magazine\ZDDesk*. The *DWORD* value *DeskCount* stores the number of desktops, and the *DWORD* values *DeskColor1* through *DeskColor9* store the color for each desktop. The string values *DeskName1* through *DeskName9* hold the names assigned to the desktops.

The code uses the *ZDRegistry* class to read and write this information to the Registry. (The methods are defined in the module *registry.cpp*.) The stored variable *DeskCount* is used on start-up to build the context menu, set limits for the Arrange screen, and so forth. The user can change all of this information while ZDDesk is running, but the Registry information is written only when ZDDesk exits.

In short, ZDDesk lets you group related programs on a particular desktop and switch to them only when you need them. This lets you run more applications without cluttering the Taskbar. Virtual desktops also afford you a measure of privacy when running applications such as an e-mailer, by letting you quickly switch from one desktop to another. □

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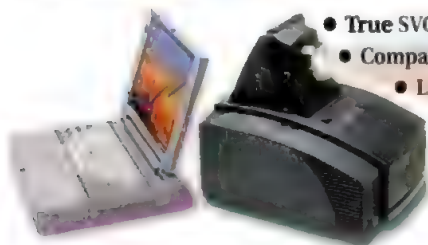


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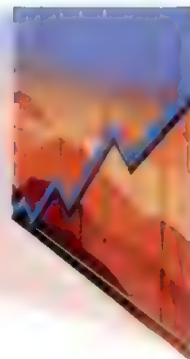
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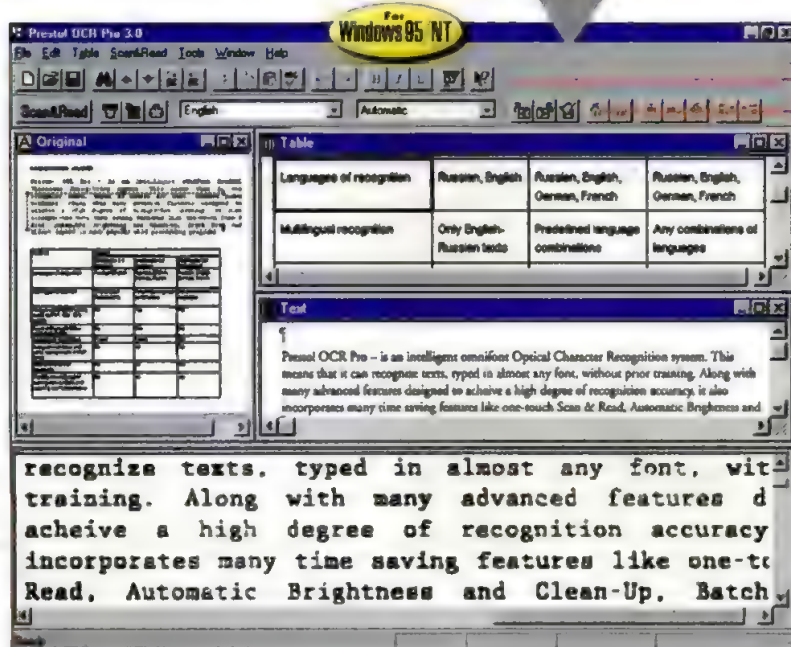
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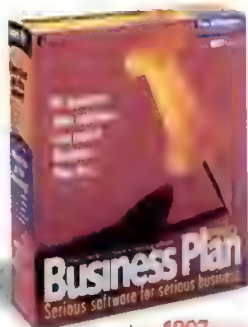
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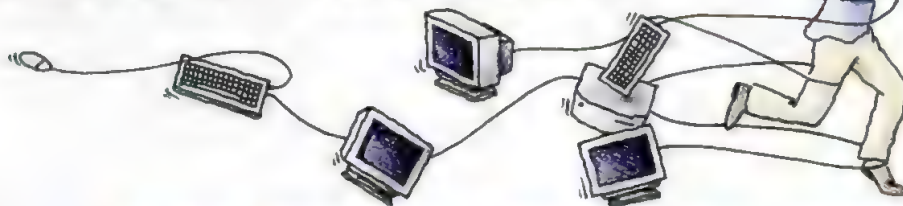
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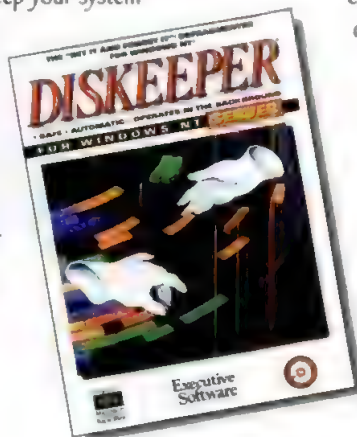
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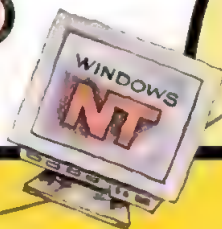
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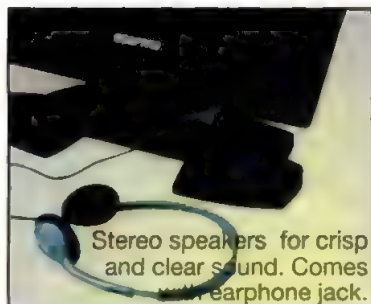
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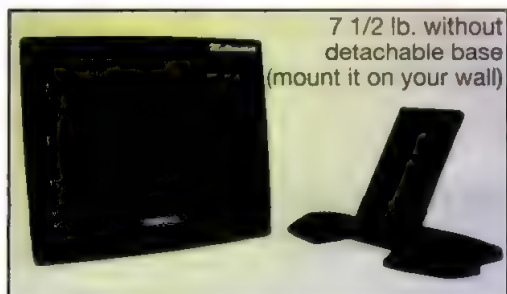
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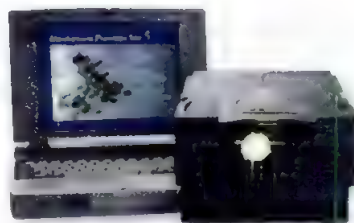
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HITACHI ELITE 751	19" (18.0")	0.22 horiz.	YES (1672)
SONY 205F11	20" (18.1")	0.30 AG	NO
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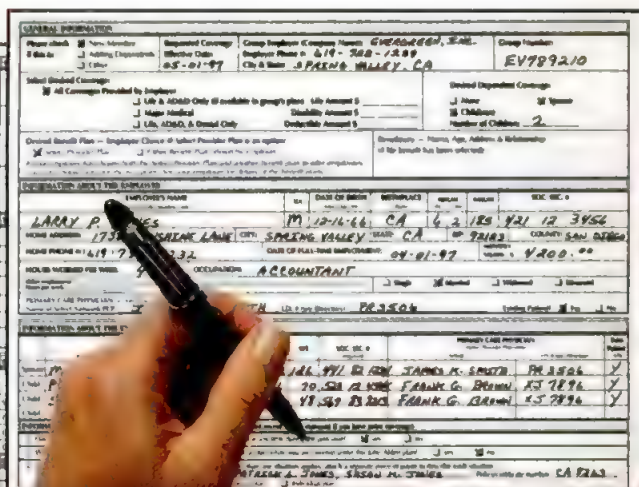
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User-to-User

BY NEIL J. RUBENKING

Associating .ZIP Files in Windows 95

The *User-to-User* column of April 9, 1996, presented two ways to associate a .ZIP file with the PKUNZIP utility in Windows 95: editing the Registry directly, and creating a .REG file. Actually, neither is necessary. If you've never associated the .ZIP extension with any program before, all you have to do is open Explorer, find a .ZIP file, and double-click on the filename. Windows 95 will ask you what program you'd like to open the file with. If PKUNZIP is in the list of choices Windows displays, highlight it by clicking on it; if not, click on the Other button and locate PKUNZIP on the directory tree. Make sure that the box "always use this program to open this file" is checked, then click OK. Now, whenever you double-click on a .ZIP file, PKUNZIP will automatically launch and unzip the file to the current directory.

If the .ZIP extension is already associated with a program, find a .ZIP file using Explorer and click on it once. Now click on the View menu selection and choose Options. Click on the File Types tab and locate the .ZIP file in the Registered File Types list. Click on the Edit button, then on the Edit button that appears in the next dialog box, and under Application used to perform action, enter the full path and filename of your PKUNZIP program (or, for point-and-click simplicity, use the Browse button to locate PKUNZIP through a directory tree). The association will now remain in effect until you change it again.

BARRY CACELLA
Monroe, New Jersey

PC MAGAZINE: Mr. Cacella is indeed correct—and a solution that avoids using RegEdit is always better than one that requires it. RegEdit is a powerful utility—so powerful that it can render a system unusable if misused. In fact, rumor has it that Microsoft may reduce RegEdit's power in future versions of Windows.

Most tasks involving file associations can be performed using the File Types page in Explorer's View | Options dialog. It's still important to know what you're doing, but if you make a mistake the worst you can do is damage the association data for the particular file type on which you were working. By making careful note of the original text for each user-editable value in the various dialogs involved in editing a file association, you can make the process almost foolproof.

Modifying Internet Auto-Search

Here's a tip for users of Microsoft Internet Explorer 3.x and Windows 95. IE 3.x lets you perform an auto-search by typing go followed by your keyword(s) in the address bar of the browser. The default search uses Microsoft/Yahoo!, but if you prefer to use a different search engine, you can change this by making a small modification to the Windows 95 Reg-

replace the quoted string in the last line with the auto-search string you want to try. Then either launch the .REG file from within Explorer or use the Start command at a command prompt to launch it: Start Auto-srch.reg.

What if your favorite search site isn't listed in the table shown here? Chances are good you can devise an auto-search string yourself. Navigate to the search site of your choice and start a simple search on any phrase, then

SEARCH STRINGS FOR MICROSOFT INTERNET EXPLORER

Search site	Auto-search string
AltaVista	www.altavista.digital.com/cgi-bin/query?pg=q&q=%s
Excite	www.excite.com/search/gw?search=%s
Infoseek	guidep.infoseek.com/Titles?qt=%s
Lycos	www.lycos.com/cgi-bin/pursuit?query=%s
Magellan	searcher.mckinley.com/searcher/cgi?query=%s
Microsoft Internet Explorer default	home.microsoft.com/access/autosearch.asp?p=%s
Yahoo! (Microsoft Internet Explorer auto-search)	msie.yahoo.com/autosearch?p=%s
Yahoo! (plain search)	search.yahoo.com/bin/search?p=%s

FIGURE 1: To change the default search engine used by Microsoft Internet Explorer to one of the ones in the left-hand column, you enter the text in the right-hand column into a registry setting.

istry. To do so, first run RegEdit and go to the following Registry key:

HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\SearchUrl

Then double-click on the (Default) value under Toolbar, and type in the text in Figure 1 that corresponds to your preferred search site. Now, when you use Internet Explorer's auto-search facility, you'll be using the search engine you like best.

CHAD WALDMAN
via the Internet

watch the Address line in the browser. When it changes, click on it and press Ctrl-C to copy it to the Clipboard. Now paste the resulting string into any text editor. It will be one long line similar to this:

```
http://www.hotbot.com/?SW=web&SM=MC&MT=foo+bar&DC=10&DE=2&RG=NA&_v=2&act.search.x=84&act.search.y=6
```

The first part of your auto-search string is the portion starting after http:// and up through and including the question mark—in this case, www.hotbot.com/?. The next portion is the text preceding your search phrase, back to but not including the first ampersand—in this case, MT=. To complete the auto-search string, add %s to the end of the line. The result in this example would be www.hotbot.com/?MT=%s; in fact, this is a working auto-search string. There's no guarantee that this will work with every search engine, but it's worth a try.

PC MAGAZINE: When you make this particular change to the Registry it takes effect immediately, even if Internet Explorer is running. Thus, you can experiment with the different choices quite easily. If you're reluctant to meddle with RegEdit, you can use the .REG file shown in Figure 2 instead. Use any text editor to create this file exactly as shown, but

REGEDIT4

```
[HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\SearchUrl]
@="www.excite.com/search.gw?search=%s"
```

FIGURE 2: Using a Registry import file like this one, you can direct Internet Explorer's auto-search to the search site of your choice.



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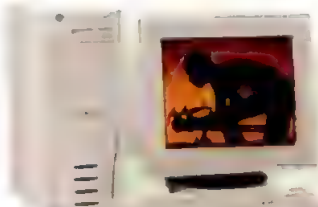
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6180/2150/CDS	180MHz Pentium Pro	32MB	2.15GB	8X	\$2509.00	72785
6200/2150/CDS	200MHz Pentium Pro	32MB	2.15GB	8X	\$2699.00	72786
6200/4200/PDS	200MHz Pentium Pro	32MB	4.2GB	PD-CD Drive	\$2879.00	84268
6233X/2150/PDS	233MHz Pentium II	32MB	2.15GB	PD-CD Drive	\$3199.00	88473
6266X/4200/CDS	266MHz Pentium II	32MB	4.2GB	8X	\$3529.00	88474
Mini-tower	CPU	RAM	Hard drive	CD-ROM	Price	CDW
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5166X/2150/PDS	166MHz Pentium MMX	32MB	2.15GB	PD-CD Drive	\$1909.00	84269
5200X/4200/PDS	200MHz Pentium MMX	32MB	4.2GB	PD-CD Drive	\$3139.00	84270
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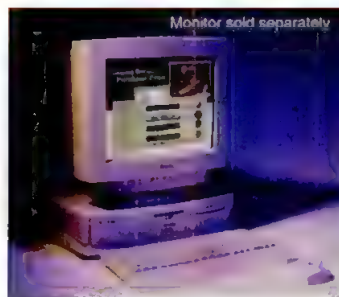
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520MCx	133MHz Pentium	16MB	1.2GB	8X	\$1599.99	84243
520	166MHz Pentium	16MB	1.2GB	—	\$1599.99	84243
520MCx	166MHz Pentium	16MB	1.6GB	16X Max	\$1699.99	84243
Mini-tower	CPU	RAM	Hard drive	CD-ROM	Price	CDW
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525MCx	166MHz Pentium MMX	24MB	2.5GB	16X Max	\$1999.99	84443
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6200D	200MHz Pentium Pro	32MB	2.95GB	12X	\$2234.52	84251
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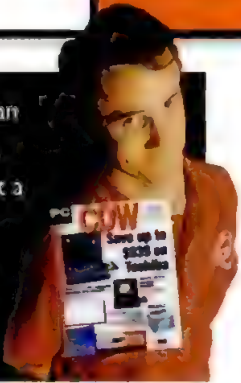
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Ask Our Advisors

HARDWARE

A Hunka Burnin' Hardware!

We are putting together a brand-new system. Is there any shareware program out there to do a burn-in?

ALLISON AND DANIEL KANE
via the Internet

PC MAGAZINE: A burn-in cycle for a new system makes a lot of sense. Even though components have become extremely reliable in recent years, most failures are cases of "infant mortality," and if you can get through the first few days of use, chances are that your system will run for a long time.

There are burn-in programs included with a number of commercial diagnostic utilities, but as you suspect, shareware programs are also available. One of the more popular ones is BurnIn, Version 4.5, from OsoSoft (\$15 registration fee). It's available from the ZDNet Software Library: Go to www.hotfiles.com and search for "hardware test" to find BurnIn and other similar programs.—*Alfred Poor*

Mix 'n' Match?

I have a Pentium/90 system that has a motherboard that supports EDO and non-EDO memory. I currently have it configured with two 8MB SIMMs that are not EDO. Can I put two EDO SIMMs in the other two slots? If I can, should I be putting them in the first two slots? Would this put them in the lower part of memory, thus making the more frequently accessed memory faster?

KIRSTEN MURPHY
Oceanport, New Jersey

PC MAGAZINE: The answer depends on the motherboard specifications, but there are indeed motherboards that allow you to mix and match EDO and non-EDO memory.

EDO (extended data out) memory works faster than traditional DRAM, because it allows for closer timing between memory accesses.

Whether your particular motherboard supports a mix of the two types of memory depends on how it is designed. For example, the technical documentation for the Intel Advanced/EV (Endeavor) motherboard states that you can mix EDO and Fast Page DRAM, provided you do not mix them within banks. The board requires 70-nanosecond Fast Page or 60-ns EDO, and "each bank will be opti-

mized for maximum performance." The fact that each bank is optimized for its memory would indicate that your plan to put the EDO RAM in Bank 0 is a sound idea, as it should yield the best performance for the combination.—*Alfred Poor*

OPERATING ENVIRONMENTS

Correcting Your User Name In Windows 95

My PC came preloaded with software, including Windows 95. Unfortunately, when the vendor loaded it, he spelled my name wrong in the internal registration. Now every time I load new software, my name is misspelled. I've tried searching the Registry—and the entire hard disk—for the wrong spelling, but I can't find it in any file. Where does Windows 95 store a user's name, and how can I change it?

RICHARD BOUCHER
via the Internet

PC MAGAZINE: The user name really is stored in the Registry, but finding particular items in the Registry can be tough. Start by launching the RegEdit utility using the Run item on the Start menu. In the tree-like view, navigate down the branches to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion. Make sure the icon next to CurrentVersion appears as an open folder. Then, in the right-hand pane, find the values named RegisteredOrganization and RegisteredOwner. You can correct the spelling of your own name (and your company's name, if necessary) by double-clicking the corresponding value.—*Neil J. Rubenking*

Clearing a Hung-Up OS/2 System

Is there a way to end programs that are hanging up my OS/2 system? The Ctrl-Esc combination doesn't always work, and even when it does, it doesn't list everything running in the system.

GEORGE MICHAELS
Atlanta, Georgia

PC MAGAZINE: OS/2 Warp 4.0 brings two new ways to clear up hung systems, one documented, one not. OS/2 handles everything the user does (mouse clicks, keyboard presses, and so on) much the way a washroom paper-

towel dispenser does. Each time you press a key or click a mouse button, a new "towel" representing that event is added to the top of the pile, but only the one at the opening in the bottom can be seen. It is the job of every graphical OS/2 program to handle every towel that pops out. If a towel doesn't apply to a particular program, the program is supposed to pass it on to OS/2 for processing.

The problem arises when a program refuses to take a towel. You can click on things and press keys to your heart's content, but all you're doing is adding more towels to the top of the pile. Until the one on the bottom is handled, the others will never be seen. In computer terms, the events are handled synchronously—one after another, in sequence. When you press Ctrl-Esc, OS/2 attempts to interrupt this sequence, detect the program that has stopped responding to those messages, and give you the option to kill the program. But sometimes the system can't even process the Ctrl-Esc to begin the interruption.

With FixPak 17 for OS/2 3.0, included in OS/2 4.0, IBM introduced a new way around this dilemma. Open the System object within

OUR ADVISORS

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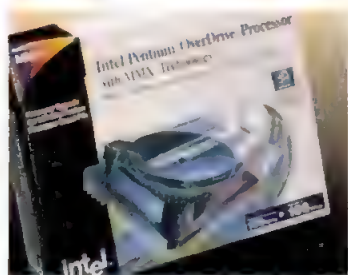
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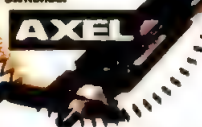
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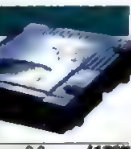
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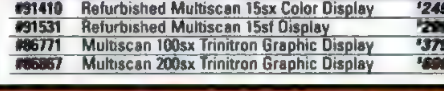
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the OS/2 System folder, and click on the User Interface tab to find the dialog shown in Figure 1. If you activate the check box labeled Asynchronous Focus, OS/2 begins running a tiny watchdog program that keeps an eye on the message queue. If a message isn't handled in the length of time you specified in that dialog, OS/2 tries to take over automatically and keep the system running. Some system hangups can foil even this watchdog, but it is more likely now that you will be able to continue running.

The other technique is a new feature that isn't listed in the documentation. If you add the line

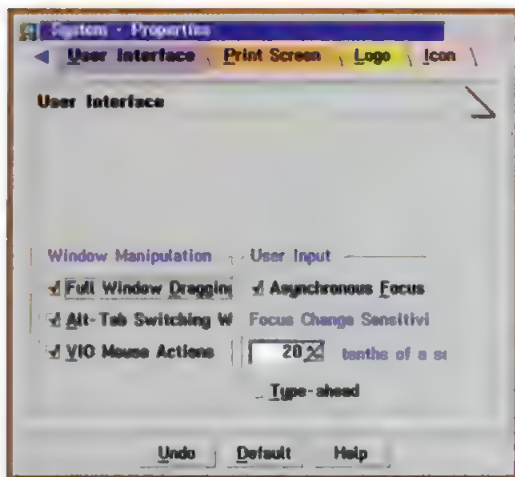


FIGURE 1: Use the User Interface dialog in the OS/2 System folder to activate a tiny watchdog program that keeps an eye on the message queue.

SET KILLFEATUREENABLED=ON

to your config.sys file and reboot, you can do a new trick with OS/2's WarpCenter. When you click on the window list button in WarpCenter, you get a list of active programs similar to the list you see when you press Ctrl-Esc. As you mentioned, however, that list doesn't include everything that is actually running in the system. With the new feature enabled, hold the Ctrl key down when you click on the

window list button, and you get a menu similar to that shown in Figure 2. The menu lists the active processes in the system, including formerly invisible items like the spooler and the Workplace Shell itself. Click on any item in the list and you will get a dialog allowing you to terminate that process—*Brian Proffit*

WORD PROCESSING

Reverse Text in Word

I would like to highlight text in Microsoft Word by making it reverse—white text on a black background. I recall doing this easily in older versions of Word, even for individual words or phrases, from a menu command. Now, according to Microsoft, the process involves a complex series of steps with borders, shading, fonts, and so on. Is there an easy way to get this effect?

RICK BODGE
via the Internet

PC MAGAZINE: You may be remembering Word for DOS, which let you print reverse text on some printers, notably Canon laser printers, by defining the font as a particular color. Different colors translated into different effects, including reverse text. This same trick may have worked with early Windows printer drivers. However, a quick test with both a Canon printer and a PCL printer shows that, for the printers I tested at least, Windows 95 drivers are smart enough to convert all colors to black for a monochrome printer—except for text you've defined as white.

The good news is that in Word 97 you can easily define individual words, phrases, or entire paragraphs as reverse text. However, the feature is hidden where you might not notice it, particularly the variation for individual words and phrases. The not-so-bad news is that in Word, Versions 6 and 7, you

can also set entire paragraphs to reverse text easily, and in Word 7 you can use the highlight feature to set individual words and phrases. Setting individual words or phrases in Word 6 takes only a little more work.

All three versions use essentially the same approach for paragraphs. In each case, the pro-

gram uses the Format | Borders And Shading command, rather than Format | Font or Format | Paragraph, but the steps are no more complex, for example, than setting text to double-spacing through the Format | Paragraph command.

To set one or more paragraphs in reverse text, place the cursor or selection in the appropriate paragraph or paragraphs and choose Format | Borders And Shading. Word 6 or Word 7 will open the Paragraph Borders And Shading dialog box. Go to the Shading tab and set Background to Black, leaving Foreground set to Auto. Note that the Foreground setting does not affect text color. Both background and foreground settings refer to shading colors should you choose a pattern instead of a solid shade. The text color, which you can set through the Format | Font command, should be left at the default Auto setting.

The steps for defining a paragraph as reverse text in Word 97 are nearly the same. Only the names of the dialog box entries are changed. When you choose Format | Borders and Shading, Word 97 will open the Borders and Shading dialog box. Here too, go to the Shading tab. Set Fill to Black and, in the Patterns box, leave Style set to the default Clear. Finally, make sure the Apply To box is set to Paragraph, and choose OK.

In all three versions of Word the background black color will fill the width of the paragraph even if the text doesn't. If you have a one-line paragraph, as in a heading, and you don't want a black bar extending wider than the text, simply put the cursor anywhere in the paragraph and redefine the paragraph width. Drag the right indent marker on the ruler to the new position and line up the marker with the end of the text by eye. If you're dealing with a multiline paragraph and don't want the black background to include all the blank space at the end of the last line, use the technique for setting individual words or phrases instead, selecting all the words in the paragraph.

To set individual words or phrases as reverse text in Word 97, follow the same steps, but select the text first and make sure the Apply To box in the Borders And Shading dialog box is set to Text rather than Paragraph before you choose OK. Note that if you don't select the text first, Word won't offer Text as an option in the dialog box.

In Word 7, you can use the highlight feature to produce reverse text. By default, the highlight button is just to the right of the underline button on the formatting toolbar. To create reverse text, choose Tools | Options to open the Options dialog box, then choose Re-

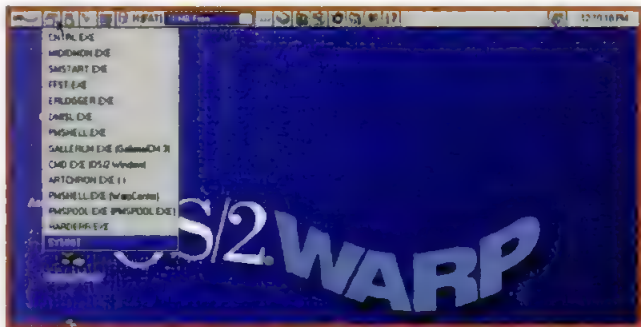


FIGURE 2: By enabling a new feature in OS/2 4.0, you can get a list of all the active processes in your system.

PCTech Ask Our Advisors

visions. At the bottom of the box, you'll find the Highlight Color option. Set it to black. Next, select the text you want as reverse text, and click on the highlight button to turn the background highlight to black. With the text still selected, choose Format | Font. Go to the Color list box and set the color to White.

Word 6 doesn't offer any easy way to set reverse text for anything less than a paragraph. However, you can get the same visual effect in other ways. The simplest for most purposes, and the only one I have room to go into here, is to insert the text as a WordArt object.

Assuming you've installed WordArt, start by placing the cursor where you want the text and choose Insert | Object. On the Create New tab, choose Microsoft WordArt. Type the text you want in the Enter Your Text Here box, accept the default Plain Text as the style, and choose the same TrueType font and font size that you're using in your document. Next, choose Format | Shading, and set Foreground to White/Black. Choose OK and return to your document.

Finally, depending on the font, you may have to adjust the vertical position of the WordArt object to match the rest of the text in the same line. Select the object, choose Format | Font, go to the Character Spacing tab, and set the position to Raised or Lowered by some number of points, as appropriate. One or two points will usually be enough.—*M. David Stone*

SPREADSHEETS

Spelling Out Numbers for Checks

Many of my Excel workbooks calculate refunds or bills to be paid. My problem is that the amount on the check needs to be written out in words. For instance, \$100 must read "One Hundred and 00/100." I have searched the function wizard for something to convert a number to words but have had no luck. I found a conversion of a number to text but it's not the same kind of text I need. Or is it? Am I missing a formatting step or do I need a macro?

JAY KEATING
via the Internet

PC MAGAZINE: You need a custom function. I've written one that handles all positive numbers from 0 through 999,999.99 and works both in Excel (as Visual Basic for Applications) and in Lotus 1-2-3 97 (as LotusScript). You can download the function from PC Magazine Online; look for the file Spell.xls in the issue archive file. To call the function, enter

```
=CheckText(number,width)
```

or

```
@CheckText(number,width)
```

where *number* is the number you want to spell out and *width* is the number of characters you want in the resulting text string. The function uses a set of asterisks to fill out the string to the desired width.

If you always want the string to have the same width, you can hard-code that number into the CheckText portion of the code. For example, if you always want an 80-character string, modify the code as follows:

```
Function CheckText(Num As Double) As String
    CombineText = Combine(Num)
    TextLength = Len(CombineText)
    NumStars = 80 - TextLength
    CheckText = CombineText +
        String(NumStars, "*")
End Function
```

The code consists of seven related functions. The first two, OneDigit and TwoDigit, do most of the work, specifying the manner in which one- and two-digit numbers are to be spelled out. TwoDigit handles all the messy details about how to build numbers between 11 and 19, when to add a hyphen in numbers greater than 20, and so on. Three-Digit makes calls to these functions to build three-digit numbers, while SixDigit calls ThreeDigit for help in building the hundreds of thousands. GetCents composes the fractional portion of the string, while Combine puts together the integer and fractional components. CheckText drives the whole process and adds the appropriate number of asterisks.

To make this function available in all your Excel workbooks, save the workbook containing the code as an .XLA (add-in) file. Then store the resulting .XLA file in your XLSTART directory. The XLSTART directory should be directly subordinate to the directory containing your Excel program files. Excel loads any workbooks or add-ins that it finds there each time you begin a new Excel session.

—*Craig Stinson*

GRAPHICS

When Slow is Better

I'm experiencing a strange file-import problem when I use FrameMaker 5 for Windows. Sometimes when I import a file from Microsoft Word for Windows 95, editing changes I know

I made don't appear. If I reopen the file in Word, though, all of the text is correct. The problem seems to be with FrameMaker. Do you know if there is any way to get around this?

THOMAS LUGANO
Toledo, Ohio

PC MAGAZINE: The solution is actually very simple, once you understand the difference between Word's Fast Save and Full Save options. When you enable Word's Fast Save option, only the changes you make to a file are saved—actually, they are appended to the original document. Unfortunately, when you open such a file in FrameMaker, you see only the original text, not the changes.

To solve the problem, disable the Allow Fast Save option in Word. You'll find the appropriate check box on the Save tab in the Options dialog box. Then open the problematic text file in Word and save it once again. With Fast Save disabled, Word will perform a full save, which means it incorporates (rather than appends) changes to the file. When you subsequently import the file into FrameMaker, the correct text will appear.

Disabling Fast Save ensures compatibility with FrameMaker and produces smaller file sizes. On the negative side, it slows down the save operation.

A quick survey of the high-end desktop publishing market reveals that both Adobe PageMaker (FrameMaker's sibling product) and Corel Ventura can correctly read fast-saved Word files. However, Adobe has no immediate plans to update FrameMaker's Word import filter to provide comparable functionality.—*Luisa Simone*

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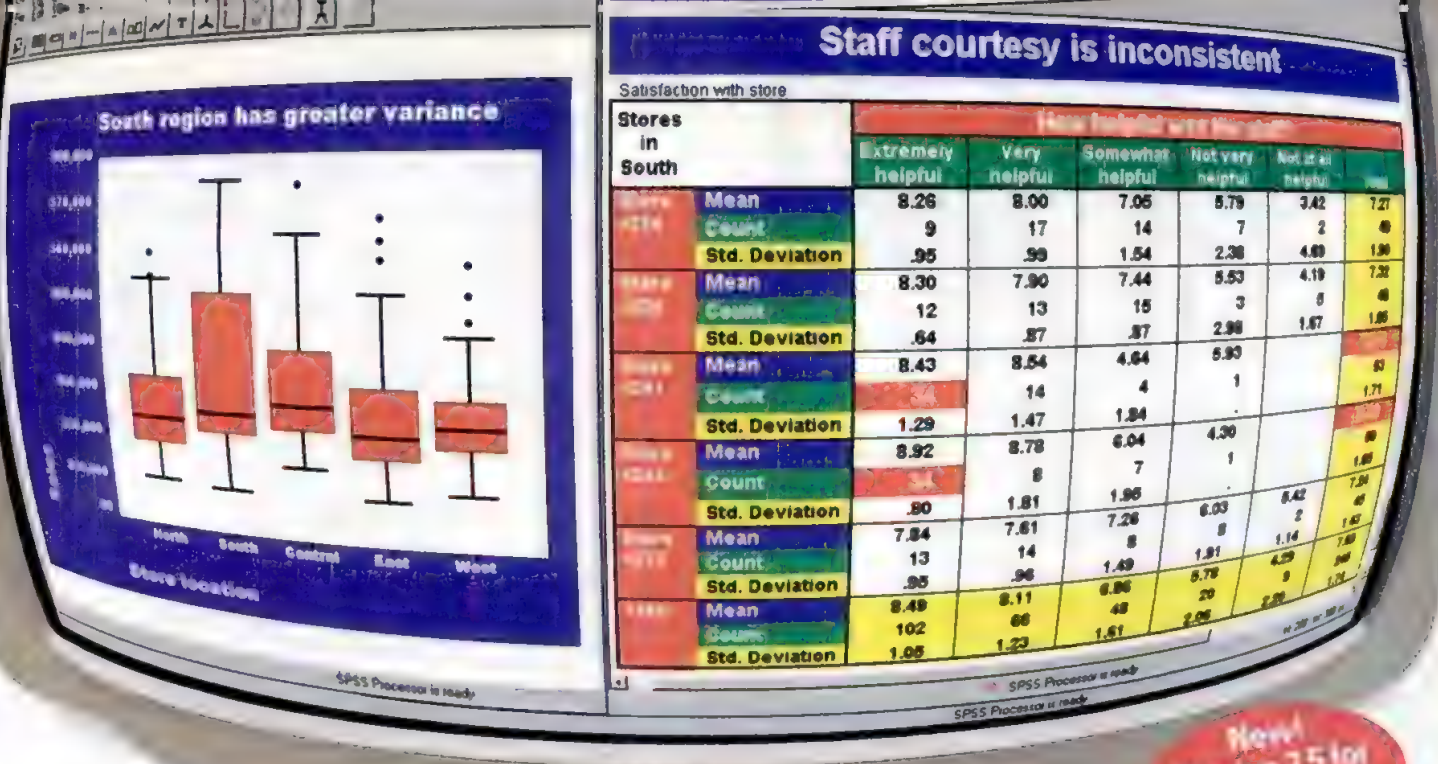


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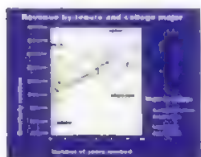
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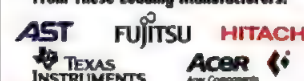
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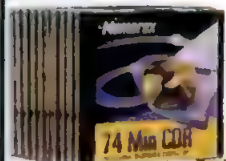
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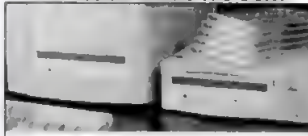
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Complete Kit with PCI controller \$809

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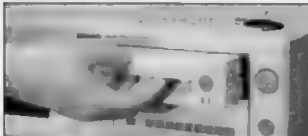
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Hard Drive	Parallel	PCMCIA
1.6GB	\$319	\$419
2.5GB	\$369	\$469
3GB	\$419	\$519
4GB	\$519	\$619
5GB	\$599	\$699

CD ROM		
16X	\$189	\$289
24X	\$209	\$309

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Internal SCSI with 1 disk \$288
External SCSI in our case with 1 disk \$348
External SCSI in Iomega case with 1 disk \$388
Disks Qty 2-4/5-9/10+ \$87/\$85/\$82

IDE HARD DRIVES

IDE	RPM	Brand	Model	Price
1200MB	5400	Fujitsu	M1636T	\$169
1275MB	4500	Seagate	ST31277A	\$179
1281MB	5200	Western Digital	AC11200	\$175
1300MB	4200	ITS	ITS1300	\$169
1624MB	5200	Western Digital	AC21600	\$186
1670MB	4480	Maxtor	M81750A	\$195
1700MB	5400	Fujitsu	M1623T	\$179
1700MB	4500	Seagate	ST31720A	\$185
1750MB	4480	Maxtor	M81750A	\$190
1750MB	5400	Fujitsu	MPA3017A	\$185
2000MB	5400	ITS	ITS2000	\$180
2100MB	5400	Fujitsu	M1624T	\$199
2000MB	5200	Western Digital	AC22000	\$203
2100MB	4480	Maxtor	M82100A	\$200
2152MB	4500	Seagate	ST32152A	\$197
2151MB	5400	Quantum	FB32160A	\$199
2187MB	4480	Maxtor	M82187A	\$218
2500MB	5400	Fujitsu	M1638T	\$199
2500MB	5200	Micropolis	MC4525A	\$199
2559MB	5200	Western Digital	AC2500A	\$217
2560MB	5400	Seagate	ST5250A	\$217
2560MB	5400	Maxtor	M82560A	\$216
2620MB	5400	Fujitsu	MPA3026A	\$209
3000MB	5400	ITS	ITS3000	\$229
3166MB	5200	Western Digital	AC33100	\$243
3228MB	5400	Quantum	FB33240A	\$259
3245MB	4500	Seagate	ST33240A	\$247
3350MB	4480	Maxtor	M83350A	\$265
3500MB	5400	Fujitsu	MPA3035A	\$249
4000MB	5200	Western Digital	AC34000	\$312
4000MB	5200	Micropolis	MC4540A	\$309
4310MB	5400	Quantum	FB34320A	\$325
4326MB	4500	Seagate	ST34320A	\$310
4335MB	3600	Quantum	BF4335A	\$230
4370MB	5400	Fujitsu	MPA3043A	\$355
5000MB	5200	Micropolis	MC4550A	\$385
5120MB	5400	Maxtor	M85120A	\$395
5250MB	5400	Fujitsu	MPA3052A	\$395
6448MB	5400	Quantum	FB6448A	\$455
6450MB	5400	Seagate	ST6450A	\$475
6480MB	3600	Quantum	BF6480A	\$372

SCSI HARD DRIVES

Add a DPT 2u44uW ultra SCSI controller \$249

SCSI	RPM	Brand	Model	Price
1050MB	5400	Seagate	ST31055N	\$269
2150MB	5400	Seagate	ST32160N	\$305
2150MB	7200	Seagate	ST32171N	\$509
2151MB	5400	Quantum	FB32160S	\$287
3228MB	5400	Quantum	FB33240S	\$355
4100MB	7200	Micropolis	MC4341	\$599
4300MB	5400	Micropolis	MC4743	\$449
4310MB	5400	Quantum	FB34320S	\$417
4350MB	7200	Seagate	ST4371N	\$759
4400MB	7200	Fujitsu	M2954S	\$629
4550MB	7200	Micropolis	MC4345	\$629
4550MB	7200	Micropolis	MC4345AV	\$779
4550MB	7200	Quantum	XP34550S	\$755
4550MB	10,000	Seagate	ST34501N	\$929
6448MB	5400	Quantum	FB64480S	\$565
9100MB	7200	Micropolis	MC3391	\$1050
9100MB	7200	Fujitsu	M2949S	\$1050
9100MB	7200	Quantum	XP39100S	\$1215
9100MB	7200	Micropolis	MC3391AV	\$1200
9100MB	7200	Seagate	ST19171N	\$1295
9100MB	10,000	Seagate	ST19101N	\$1599
23500MB	5400	Seagate	ST423451N	\$2799

WIDE HARD DRIVES

Add a DPT 2u44uW ultra wide SCSI controller for \$279

WIDE	RPM	Brand	Model	Price
1050MB	5411	Seagate	ST31055W	\$349
2150MB	7200	Seagate	ST32171W	\$539
4294MB	7200	Micropolis	MC3243W	\$629
4294MB	7200	Micropolis	MC3243WAV	\$789
4350MB	7200	Seagate	ST34371W	\$789
4400MB	7200	Fujitsu	M2954W	\$659
4550MB	7200	Micropolis	MC4345W	\$659
4550MB	7200	Micropolis	MC4345WAV	\$829
4550MB	7200	Quantum	XP34550W	\$775
4550MB	10,000	Seagate	ST34501W	\$979
9091MB	5400	Micropolis	MC3391W	\$1080
9091MB	5400	Micropolis	MC3391WAV	\$1250
9100MB	7200	Fujitsu	M2949W	\$1089
9100MB	7200	Quantum	XP39100W	\$1239
9100MB	7200	Seagate	ST19171W	\$1349
9100MB	10,000	Seagate	ST19101W	\$1599
23500MB	5400	Seagate	ST423451W	\$2799



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CD ROM DRIVES

Speed	Brand	Model	ms	Int
12X	Toshiba	XM5702B	115	\$100
16X	Exilis	DELTA16X	120	\$88
16X	Lite On	LTN262A	120	\$92
16X	Mitsumi	CRMCF16X	120	\$104
16X	NEC	CDR1600	100	\$99
16X	Toshiba	XM6002B	90	\$105
18X	Acer	AC616A	120	\$105
20X	Lite On	LTN202A	120	\$105
24X	Delta	DELTA24X	99	\$99
24X	Panasonic	CR585	85	\$125

IDE CD CHANGERS
Speed Brand Model # Disks Int
6X NEC CDR4X6 4 \$89
8X NEC CDR8X8 4 \$129

ACCESSORIES
Buy a CD drive & sound card & get a FREE audio cable
Creative Labs Sound Blaster 16 Value PnP (SB16E) \$83
Creative Labs Sound Blaster AWE64 (SB64AWE) \$100
Creative Labs Sound Blaster AWE64 (SB64AWEOLD) \$180
Professional speakers with Bose style swivel speakers and separate subwoofer
25 Watt (SPEAKER1) \$99 15 Watt (SPEAKERPRO) \$129
Universal sound cable (AUDIOMIX) \$9
Turn any IDE CD ROM into an external for parallel printer port (PPCASECD) \$99
Turn any IDE CD ROM into an external for PCMCIA port (PCMCIACASECD) \$189

Speed	Brand	Model	ms	Int
12X	Toshiba	XM5701B	115	\$149
12X	Plexstor	PX12TS(tray)	105	\$219
12X	Plexstor	PX12CS(caddy)	105	\$259
15X	Toshiba	XM3801B	99	\$179
18X	NEC	CDR1610	100	\$179
20X	Plexstor	PX20TS	95	\$239

SCSI CD CHANGERS

Speed	Brand	Model	# Disks
4X	Pioneer	DRM624X	6
16X	Nakamichi	MJS16	4

SCSI CD TOWERS

Speed	Brand	Model	# Disks
12X	Toshiba	115ms	\$899
15X	Toshiba	89ms	\$1129
16X	NEC	100ms	\$929
20X	Plexstor	95ms	\$1399

SCSI CD TOWERS w/ 4 Disc Changers

Speed	Brand	Model	# Disks
16X	Nakamichi	150ms	\$1299

CD RECORDERS

Sony 2x6
Internal SCSI drive (CDU9265) \$339

Tamashu 4x8
Internal SCSI drive tray load (YCDR400T) \$639
Internal SCSI drive caddy load (YCDR400) \$649

Philips 2x6 (\$200 Philips rebate until 6/30/97)
Complete kit includes software controller, and 1 disk
Internal SCSI (CD02600) \$895

Hewlett Packard SureStore 6020i

SureStore 6020i includes software, and 1 disk
Internal SCSI (C4343CDR) \$440
Complete internal kit w/ controller (C4343CDR 1), \$495
External for parallel printer port (C4345A) \$545

Sony 2x8

Internal IDE (CDU9285) \$399
Kit w/ 1 disk, and software compatible with Win 95 & Win NT 3.51 & up. Req. IDE controller. (CDU9285KIT) \$429

Mitsumi 2x6
IDE kit includes 3 disks, and software compatible with Win 95 & Win NT 3.51 & up. Requires IDE controller. Internal (CRM2600TE) \$460

OTHER HARD DRIVES

2 1/2" IDE	Model	Price
1080MB	4200 Toshiba MK1002MAV	\$219
1400MB	4200 Toshiba MK1401MAV	\$269
2160MB	4200 Toshiba MK2103MAV	\$369
3080MB	4200 Toshiba MK3303MAV	\$629

SCA Single Connector Attachment

Model	Price
2150MB 7200 Seagate ST32171WC	\$619
4350MB 7200 Seagate ST34371WC	\$889
4550MB 10,000 Seagate ST34501WC	\$999
9100MB 7200 Seagate ST19171WC	\$1399
9100MB 10,000 Seagate ST19101WC	\$1699

FC-AL Fibre Channel - Arbitrated Loop

Model	Price
4550MB 7200 Seagate ST34572FC	\$call
4550MB 10,000 Seagate ST19171FC	\$1059
9100MB 7200 Seagate ST19171FC	\$1569
9100MB 10,000 Seagate ST19101FC	\$1699

TAPE DRIVES

EXABYTE	Model	Price
3.5-7Gig	8mm 32MB/min, EXB8205XL	\$1189
7-14Gig	8mm, 120MB/min, ELIANT820	\$1549
7-14Gig	8mm, 60MB/min, EXB8700LT	\$729
7-14Gig	8mm, 60MB/min, EXB8700	\$1069

DBE100 includes tape cleaner tape and backup software

Model	Price
20-40Gig 8mm 360MB/min, EXB100	\$4329
70-140Gig 8mm 60MB/min, EXB10H	\$4259

HEWLETT PACKARD

Model	Price
2Gig DAT 11MB/min, C1534AI	\$579
2-4Gig DAT DC, 42MB/min, C1536AI	\$619
4-8Gig DDS-2 DAT, 60MB/min, C1599AI	\$939
12-24Gig DDS-3 DAT, 120MB/min, C1554AI	\$1379
12-24Gig DDS-3 DAT, 120MB/min, C5648A	\$2779

SEAGATE

Model	Price
2-4Gig DAT-DC, 48MB/min, C4324RP	\$629
4-8Gig Mini, 29MB/min, TST8000	\$339
4-8Gig DDS-2 DAT, 48MB/min, C4326NP	\$739
48-96Gig DDS-2 DAT, 48MB/min, C4368NP	\$1849

SEAGATE MINI CART

Prices include Dos/Vin backup software & 1 tape

Model	Price
800MB TR1, TST800R \$99 Parallel ver	\$125
3-2Gig TR3, TST3200 \$169 Parallel ver	\$185
4-8Gig TR4, TST8000 IDE or SCSI	\$339

SONY

Model	Price
4-8Gig DDS-2 DAT, 44MB/min, SDT5000AI	\$789
4-8Gig DDS-2 DAT, 90MB/min, SDT7000AI	\$849
12-24Gig DDS-3 DAT, 144MB/min, SDT9000AI	\$1069
12-24Gig DDS-3 DAT, 90MB/min, TSL7000X	\$2159

QUANTUM

Model	Price
15-30Gig DLT 150MB/min, DLT2000XT	\$2679
15-30Gig DLT 180MB/min, DLT4000XT	\$4099
75-150Gig DLT reader, 50MB/min, DLT5000XT	\$4949
100-200Gig DLT reader, 60MB/min, DLT4500	\$6819
105-210Gig DLT reader, 50MB/min, DLT2700XT	\$6879
140-280Gig DLT reader, 60MB/min, DLT4700	\$8629

REMOVABLE DRIVES

IOmega 100MB ZIP

Model	Price
Internal SCSI for PC (ZIP1000)	\$148
Internal IDE for PC (ZIP1000A)	\$148
External SCSI for PC or Mac (ZIP100)	\$148
External for PC parallel port (PPZIP100)	\$148
100MB disks (ZIP100C) Qty 2-9/Qty 10+	\$18/\$14

IOmega 1Gig JAZZ

Model	Price
Internal SCSI with 1 disk (JAZZ)	\$288
External SCSI in our case with 1 disk (JAZZ)	\$348
External SCSI in Iomega case with 1 disk (JAZZ)	\$388
Disks Qty 2-4/5-9/10+ 1Gig	\$87/\$85/\$82

SYQUEST 230MB Flyer

Model	Price
Ext. SCSI (EZ305)	\$799
Ext. Parallel (EZ30P)	\$199



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M500 Multimedia (15"/13.7" VIS)	\$369
M700 Multimedia (17"/15.7" VIS)	\$769
Multisync XV15+ (15"/13.7" VIS)	\$379
Multisync XV17+ (17"/15.7" VIS)	\$679

VIEWSONIC	
VS-15E (15"/13.7" VIS)	\$334
VS-15GA (15"/13.7" VIS)	\$349
VS-17E (17"/15.7" VIS)	\$399
Sonictra VS-PT70 (17"/15.7" VIS)	\$789
VS-20G (20"/18.6" VIS)	\$1114
20G (20"/18.6" VIS)	\$1199
VS-G810 (21"/19.5" VIS)	\$1429

MAG INNOVISION	
DX1595 (15"/13.7" VIS)	\$289
DX1795 (17"/15.7" VIS)	\$619
DX700T (17"/15.7" VIS)	\$749

MONITORS/GRAPHICS CARDS	
PREDATOR GRAPHICS	
E040 (14"/13.4" VIS) .28dp	\$229
E050 (15"/13.8" VIS) .28dp	\$289
E070 (17"/15.8" VIS) .28dp	\$499
E075 (17"/15.8" VIS) .28dp	\$619

SONY	
100SX (15"/13.7" VIS)	\$379
100SF (17"/15.7" VIS)	\$429
200SF (15"/13.7" VIS)	\$799
300SF (20"/19" VIS)	\$1699

PANASONIC	
PanaSync S15 (15"/13.7" VIS)	\$329
PanaSync S17 (17"/15.7" VIS)	\$619
PanaSync P17 (17"/15.7" VIS)	\$749
PanaSync E21 (21"/19.5" VIS)	\$1429

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T2312EDO Terminator 3D PCI 2MB	\$59
T2314EDO Terminator 3D PCI 4MB	\$129
T2312EDO Terminator 64 PCI 2MB	\$79

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Snappy Video Capture	\$189

ATI	
Video Xpression + 2MB	\$99
3D Xpression + PC27X 2MB	\$139
3D Pro Turbo PC27X 4MB	\$199
GP0701 RBOPCI4 3D Pro Turbo PC27X 8MB	\$299

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GBMA202 Graphics Blaster MA202	\$49
GBMA302 Graphics Blaster MA302	\$79
GBMA334 Graphics Blaster MA334	\$99

MULTIMEDIA/CD-ROM	
MultiSpin 8X/4X	\$299/\$399
PANASONIC	
Portable 4X CD-ROM Drive	\$299
Portable 4X CD-ROM Drive w/Speakers	\$399
PHILIPS	
2X/6X CD-Writer Internal	\$499
2X/6X CD-Writer External	\$599
8X CD-ROM Drive Internal	\$199
8X CD-ROM Drive External	\$299
CREATIVE LABS	
Sound Blaster AWE64 PnP	\$149

MULTIMEDIA/CD-ROM	
Sound Blaster AWE64 Gold	\$199
Sound Blaster 16 Value PnP	\$74
Blaster CD 1800	\$139
Sound Blaster Discovery AWE64/2400	\$299
Sound Blaster Performance AWE64 Gold	\$349
PINNACLE MICRO	
Apex 4.6GB Optical External	\$1899
4X CD-Writer - Internal	\$789
4X CD-Writer - External	\$899
PLEXTOR	
8Plex Internal w/o interface	\$349

MULTIMEDIA/CD-ROM	
8Plex External w/o interface	\$449
8Plex External w/ISA Card	\$499
8Plex External w/PCI Card	\$429
ALTEC LANSING SPEAKERS	
ACS45 6W Speakers	\$79
D1-ACS51 6W Power cubes	\$54
D1-ACS53 2TW	\$149
D1-ACS500 80W	\$299
HEWLETT-PACKARD	
HP SureStore CD-Writer 2X/6X External Parallel	\$569
HP SureStore CD-Writer 2X/6X Internal	\$479

IBM Aptiva S Series	
S64 P166, 16MB, 2.5GB, 8X CD-ROM, 33.6MBM	\$1299
S66 P166, 16MB, 2.5GB, 8X CD-ROM, 33.6MBM	\$1399
S80 P166MMX, 32MB, 2.5GB, 8X CD-ROM, 33.6MBM	\$1999
S9C P200MMX, 32MB, 2.5GB, 16X CD-ROM, 43.6MBM	\$2199

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DeskPro 2000, P133, 16MB, 1.2GB	\$1089
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DeskPro 4000 P166, 16MB, 1.62GB	\$1399
DeskPro 4000 P166, 32MB, 2.5GB, 8X CD-ROM	\$1789
DeskPro 6000 P166, 32MB, 2.18GB, 8X CD-ROM	\$2019
DeskPro 6000, Pentium® Pro 200, 42MB, 2.1GB, 8X CD-ROM	\$2819

DESKTOP SYSTEMS	
PR-166 Special-MT PR166, 512K, 16MB, 2GB, 2MB 3D 16X CD, Sound	\$999
Performance-MT desktop PR 200 512K, 32MB, 4GB, 4MB 3D, 16X CD, Sound	\$1499
Cybernetix P166/MMX, 16MB, 2GB, 2MB 3D, 16X CD, Sound, 15" BJC-240	\$1599
Multimedia Classic P166 w/MMX, 32MB, 4GB, 4MB 3D, 16X CD, Sound, 17" Display 60Hz	\$2599
Basic Workstation P133 512K, 16MB, 2GB, 16X CD, Sound, 14"	\$1199
Business Workstation P200 512K, 32MB, 4GB, 4MB 3D, 16X CD, Sound, 17"	\$1899
Litmus Workstation: P133 64MB, 8GB Zip Drive, 4MB VRAM, 16X CD, Sound, 17"	\$3299

Other prices/figures models available. Monitors listed as CRT size. Visible size is smaller.

HP Vectra 500 Series	
520 S/133 P133, 16MB, 1.2GB	\$999
320 CD S/166, P166, 16MB, 1.6GB, 8X	\$1259
520MCX S/166, P166, 16MB, 1.2GB, 16X	\$1399

USA FLEX SYSTEMS	
Satellite 220CDS P133 12.1" DSTN, 1.4GB	\$1889
Satellite Pro 420CPT P100, 11.5" Act. 1.2GB	\$1779
Satellite Pro 430CPT P120 11.5" TFT 1.2GB	\$2199
Terra 500CPT P120, 12.1" Act. 1.9GB	\$2899
Terra 510CPT P133, 12.1" Act. 2.0GB	\$3379
Terra 530CPT P150, 12.1" Act. 2.0GB	\$4299
Terra 540CPT P166 w/MMX, 14.5" Act. 2.0GB	\$5499
Portage 650CT P133, 1.9GB	\$3399
Portage 660CPT P133 Act. P150, 1.9GB, 10X CD	\$4229

SCANNERS	
EPSON	
PhotoPlus Scanner	\$199
Action Scanner II (PC)	\$279
ES1000C (PC)	\$499
Flatbed Scanner 636 (Pro)	\$1399
Flatbed Scanner 636 (Artists)	\$999
Flatbed Scanner 636 (Exec)	\$799

MICROTEK	
PageWiz	\$99
Scanmaker E3	\$199
Scanmaker E6	\$329
Scanmaker E6 Pro	\$529

TOSHIBA	
Satellite 220CDS P133 12.1" DSTN, 1.4GB	\$1889
Satellite Pro 420CPT P100, 11.5" Act. 1.2GB	\$1779
Satellite Pro 430CPT P120 11.5" TFT 1.2GB	\$2199
Terra 500CPT P120, 12.1" Act. 1.9GB	\$2899
Terra 510CPT P133, 12.1" Act. 2.0GB	\$3379
Terra 530CPT P150, 12.1" Act. 2.0GB	\$4299
Terra 540CPT P166 w/MMX, 14.5" Act. 2.0GB	\$5499
Portage 650CT P133, 1.9GB	\$3399
Portage 660CPT P133 Act. P150, 1.9GB, 10X CD	\$4229

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- 48MB Pentium® Processor
- 4GB Hard Drive
- 16MB RAM
- 12.1" DSTN VGA Color Display
- 8X CD-ROM

\$2499

IBM

HEWLETT-PACKARD PALMTOP 320LX

- 640 x 480 Backlit Screen
- 3MB
- 300K x 2MB

\$659

\$469

HP

HITACHI Mx Series	
MX135T P133 1.9GB 8X CD-ROM, 33.6	\$2799
MX166TMMX P166 MMX, 2.1GB, 8X CD-ROM, 33.6 12.1" TFT	\$4199

COMPAQ DESKPRO 2000

- 133MHz Pentium Processor
- 1.2GB Hard Drive
- 16MB RAM/2MB max

\$1199

COMPAQ

Canon BJC-4200

- 1p 200x
- 1p to 3ppm

\$279.95

Canon

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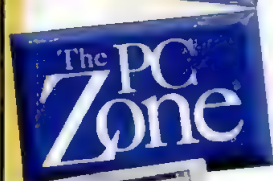
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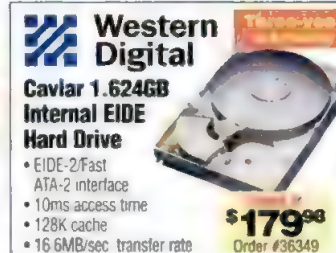
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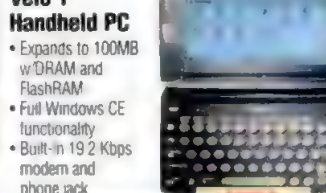
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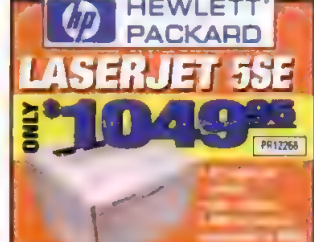


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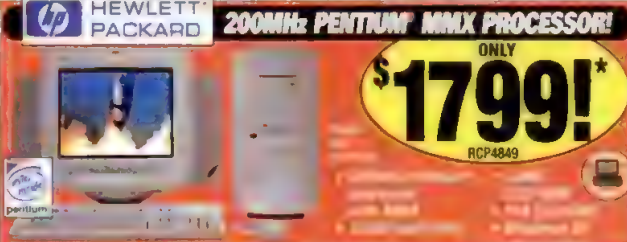
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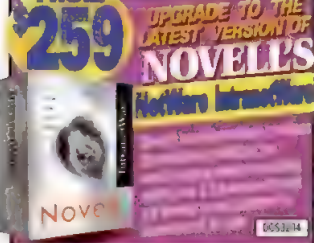
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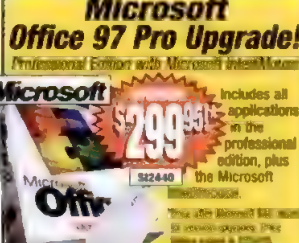
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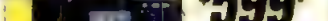
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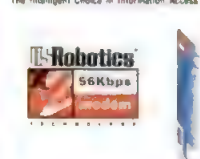
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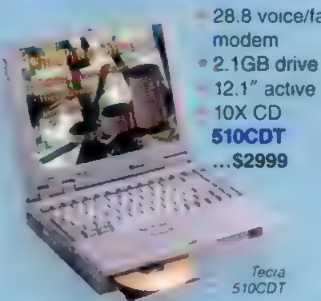
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3636	325	620	190	630

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600	200	1200	1600	1600
600	200	1200	1600	1600
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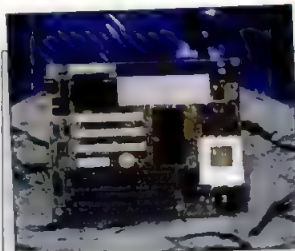
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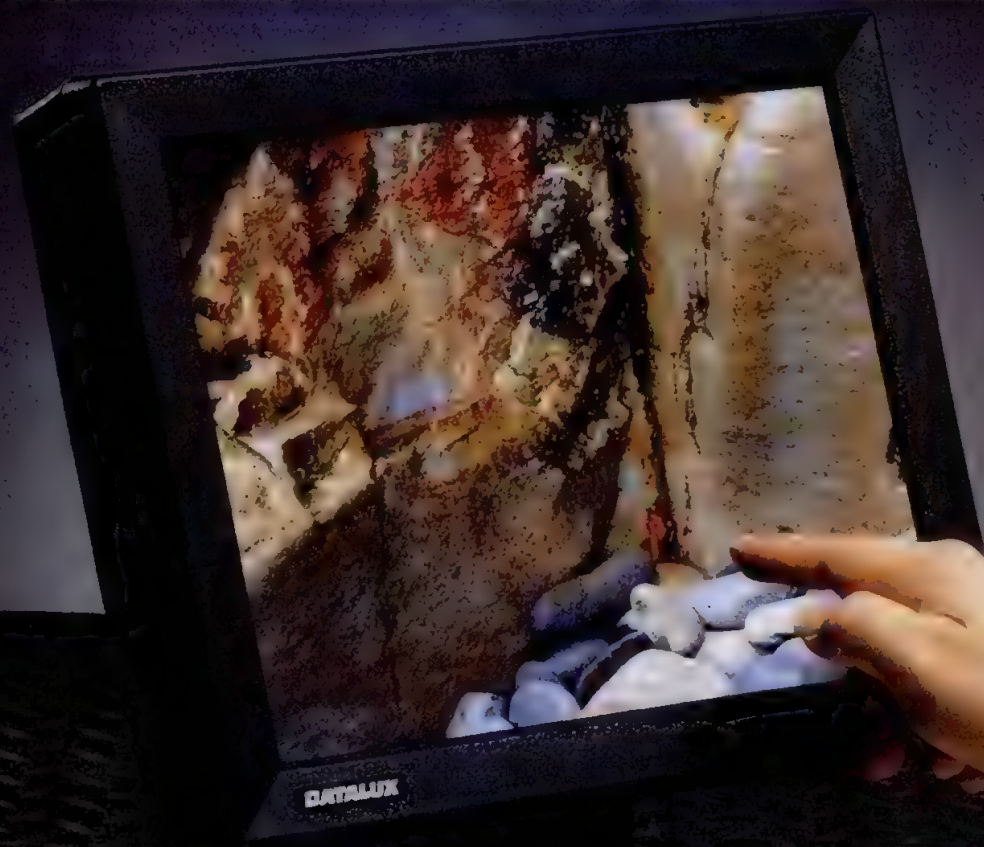
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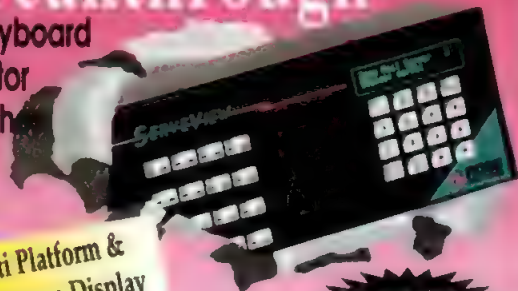
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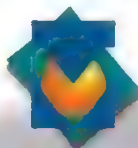
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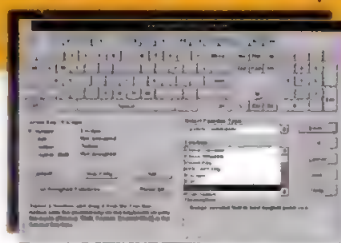


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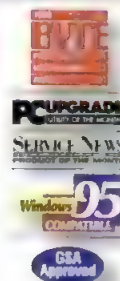
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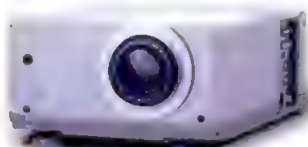
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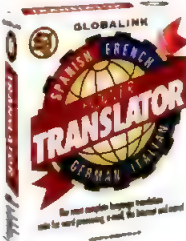
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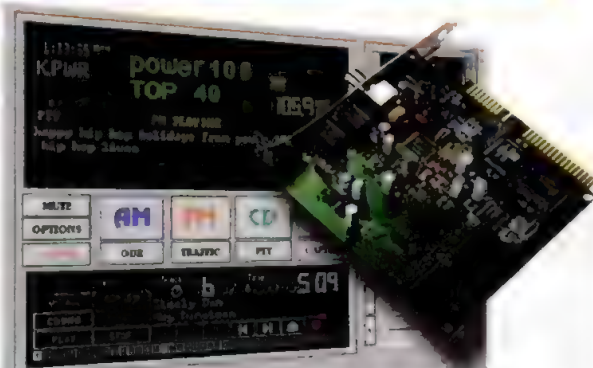
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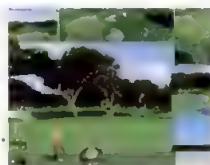
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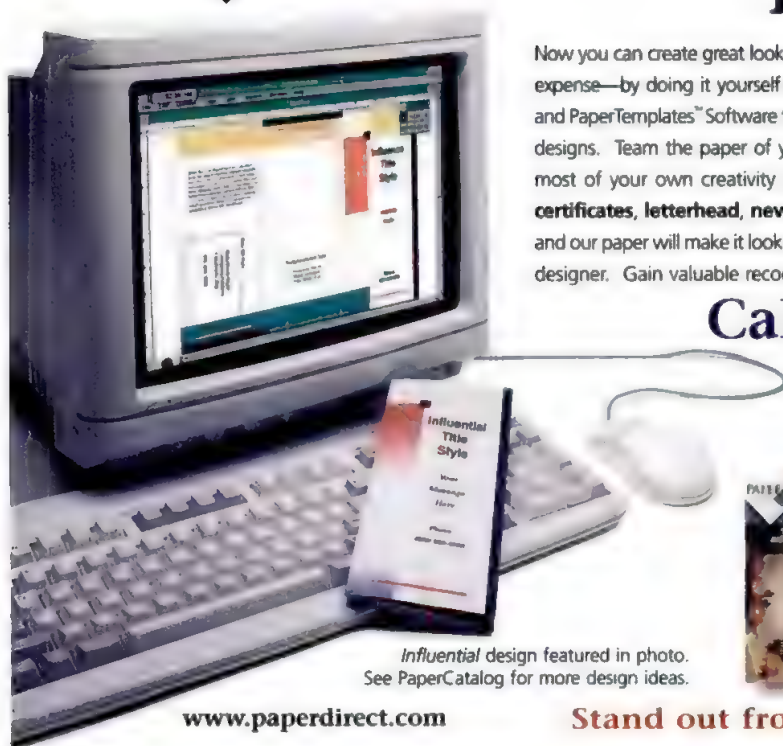
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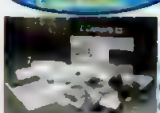
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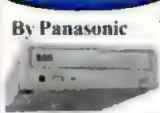
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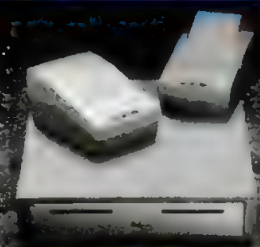
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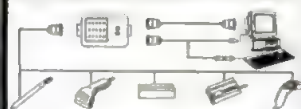
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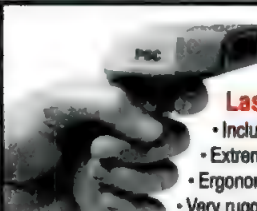
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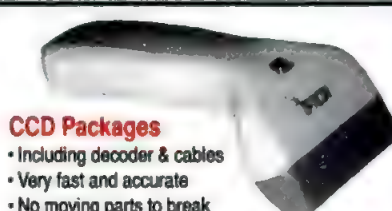
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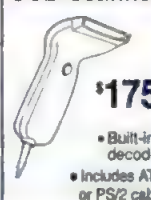
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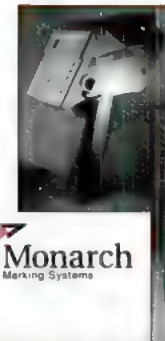
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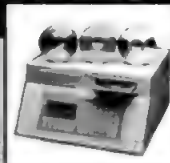
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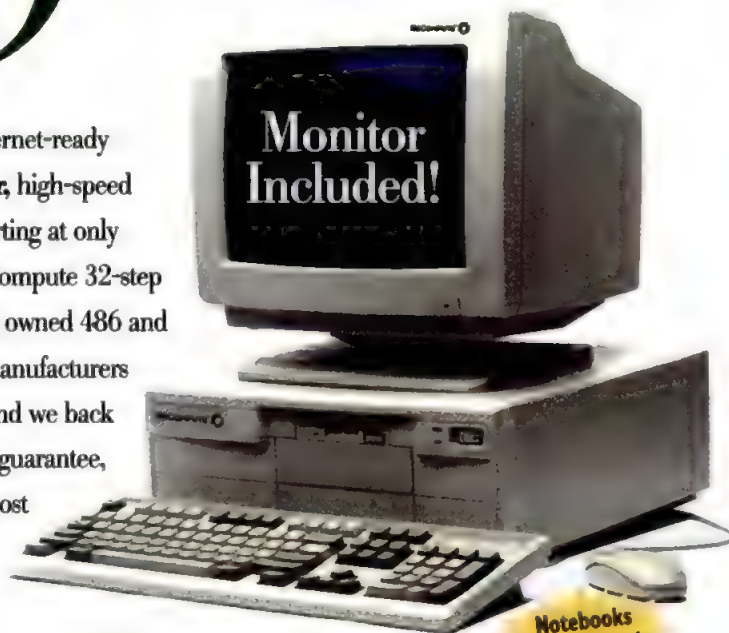
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After Hours

Sci-Fi Standouts?

Two new games aim to bring science-fiction universes to life. One succeeds.

X-Wing vs. TIE Fighter

LucasArts has given us many computer games based on *Star Wars*, but none so eagerly anticipated as *X-Wing vs. TIE Fighter*. With this game, *Star Wars* fans can—for the first time—take part in thrilling starfighter dogfights against human opponents. This ability alone practically guarantees retail success, while the stunning graphics and solid game play are enough to make the game horribly addictive, despite several disappointing flaws.

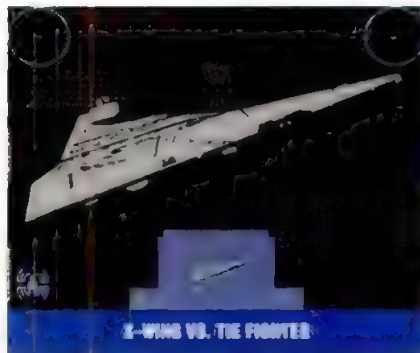
The graphics in this Windows 95 game are spectacular—easily the best around for a space-combat game and better than most simulations. The downside is that you need a

powerful system to see the graphics at their best: A Pentium/166 with 32MB RAM is the minimum we recommend.

X-Wing vs. TIE Fighter offers both single and multiplayer capabilities, but the single-player mode seems like an afterthought. You can take part in 11 melee missions and fly for either the Rebellion or the Empire in 16 combat engagements.

Training missions round out the list: Rebels can fly 16, Imperial

pilots 14. You can string together a few combat engagements to form mini-campaigns, but these aren't as compelling as the epic battles from the original *X-Wing* and *TIE Fighter* games. Most of the training missions are not terribly challenging, and the melee missions



are mostly dogfights that tend to get boring unless you play them in multiplayer mode, which is the game's true calling.

With support for two players over modem and direct serial links, four players over the Internet, and eight players over a LAN, *X-Wing vs. TIE Fighter* offers excellent multiplayer options. Microsoft's Internet Gaming Zone is the game's online home.

During our tests on the Zone, online play was challenging and a lot of fun, and it never took us more than 30 seconds to get a three-player game going (four-player games were invariably too slow and choppy). Unfortunately, these games didn't go very far, as frequent crashes and lock-ups led to intense frustration. As we went to press, LucasArts released a patch that improved Internet play, but we still ran into choppy performance and an occasional crash.

Some minor quibbles: Although you can fly nine different ships in this game, including the *X-Wing* and *TIE Advanced*, you can't fly the *B-Wing*, *Missile Boat*, *TIE Defender*, or *T-Wing*. Also, most of the combat missions in this game are incredibly difficult and cannot be simplified in multiplayer mode. To make matters worse, they actually get

harder if you team up with other players against the computer.

Despite all of its annoyances, however, *X-Wing vs. TIE Fighter* is exciting, impressive, and nearly impossible to stop playing. It's a must-have for any *Star Wars* fan, and—when it works—one of the

best multiplayer action games around. With more ships and missions, more stable Internet play, and better difficulty settings, this game would be much stronger.—Michael E. Ryan

Star Trek Generations

Boldly attempting to go where only a few have successfully gone before, *Star Trek Generations* (based on the movie of the same

INSIDE

Politically Incorrect

Interplay goes way over the top with this action game. *Page 441.*



Humility 101

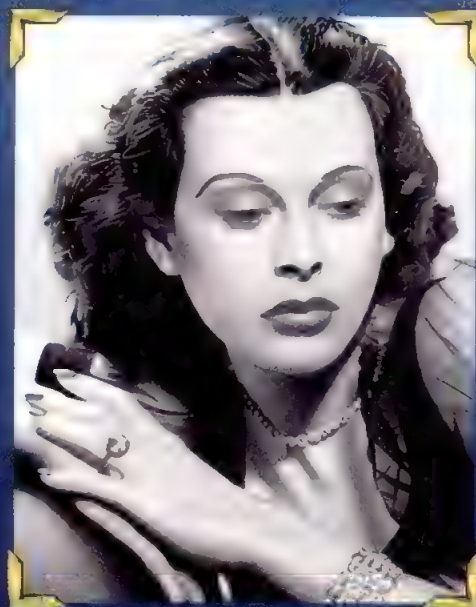
Think you know your movie trivia? Well, you don't know Jack. *Page 446.*

Comanche Returns

The popular, action-packed helicopter sim gets a major face-lift. *Page 446.*



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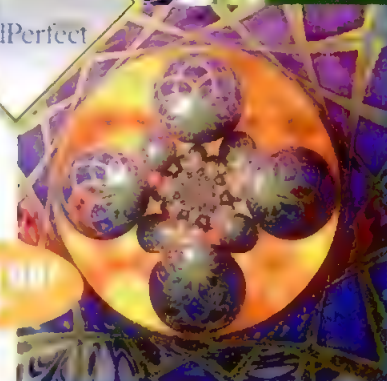
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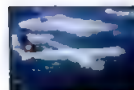
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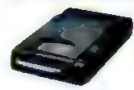
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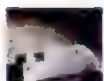
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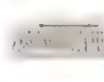
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After Hours

name) combines multiple gaming genres into a single gaming experience. Unfortunately, this title is marred by numerous design flaws and never realizes its full potential.

Generations starts out in a grand fashion, with a well-edited sequence of clips from the movie. This sets up the plot: An evil alien named Soran is trying to return to a dimension known as the Nexus and is destroying stars left and right in

locate the fiend, take part in a series of first-person action sequences (away missions), and survive a number of simulator-style space-combat encounters. Stellar Cartography is the highlight of the game, but consider that a warning, since not much happens here: You locate systems in which Soran might be hiding, scan them, and beam down an away team.

This is where the game begins to unravel. The 12 away-team missions are played from the first-person perspective, but the graphics engine is unimpressive at best. The game's low-resolution graphics are often difficult to make out and are simply not what they should be considering the state of the art—especially with

the game's recommended configuration of a Pentium/166 with 32MB of RAM. Movement controls, though customizable, are awkward, and a huge status panel covers the bottom half of the screen; no,



you can't get rid of it.

The starship combat sequences are, if anything, less impressive than the away missions. Again, movement controls are awkward, and the interface is too clunky for the speed of the combat. The ship graphics are blocky, and the phaser effects are simply red lines on-screen. On the other hand, the photon torpedoes are very well rendered. On top of everything, the game spends

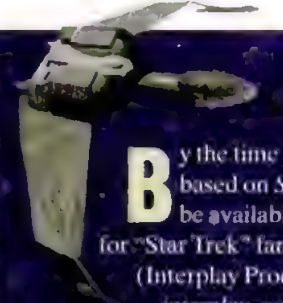
inordinate amounts of time loading between missions, even when you install 75MB worth of data on your hard disk.

X-Wing vs. TIE Fighter may be impressive and fun despite its shortcomings, but Star Trek Generations simply isn't. Die-hard "Star Trek" fans may get a kick out of this game, but we were disappointed and couldn't help thinking about what a great game it might have been.—MER



his effort to do so. You, the crew of "Star Trek: The Next Generation," and the long-lost Admiral Kirk must stop him.

To do so, you must employ a bit of strategy in the game's Stellar Cartography section to



Coming down the Space Lanes

By the time you read this, three more games based on *Star Wars* and "Star Trek" should be available. The first will be welcome news for "Star Trek" fans: Interplay's **Starfleet Academy** (Interplay Productions, 714-553-6678, www.interplay.com) will challenge players to complete a stint at the Academy and graduate as Starfleet officers. The real fun comes from 29 space-combat missions, in which you command the *Enterprise-A* against Klingon Birds of Prey and other foes. The game's 3-D graphics engine is stunning—possibly as good as X-Wing vs. TIE Fighter's—and the game play looks to be a lot of fun. Look for William Shatner, Walter Koenig, and George Takei during the game's live-action scenes.

On the *Star Wars* front, LucasArts is wrapping up work on two new titles. The first, **Rebellion** (LucasArts



Entertainment Co., 415-472-3400, www.lucasarts.com), is a strategy game in which you command either Rebel or Imperial forces in an effort to take over the galaxy. To win, you must control fleet development and deployment, manage resources, and take charge of political activities for your side. To keep things challenging, fleet combat takes place in real time.

LucasArts' second *Star Wars* game is **Jedi Knight: Dark Forces II**. This sequel to 1995's *Dark Forces* is a first-person action game in which you play Kyle Katarn, a mercenary turned hero who is trying to become a Jedi. The game's advanced features will include the ability to use the Force (the Light or Dark side) and to wield a light saber. The game will also have a phenomenal 3-D graphics engine (similar to Quake's) and multiplayer capabilities.—MER



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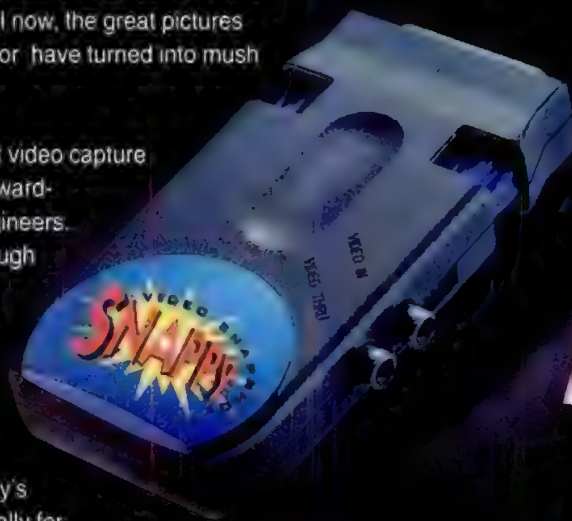


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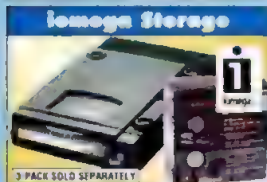
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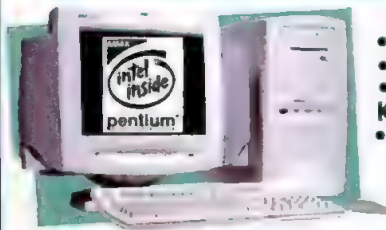


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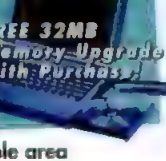
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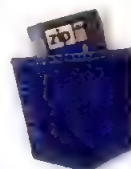
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After Hours

Moonshine and Moonpies

Interplay's first-person action game is twisted and offensive, but it's fun, too.

Redneck Rampage

Redneck Rampage is insulting, offensive, and in many ways tasteless, but it's also possibly the best game since the original Duke Nukem 3D to take advantage of 3D Realms' Build graphics engine. The game pushes not only the engine to the limit but your system as well. In low-



resolution mode, it crawls like a rebel hound on a Pentium/100, so make sure you have a high-end system with plenty of hard disk space (Redneck Rampage requires an absurd 150MB). Even on a P/200, there was some slowdown in high resolution. Oh, and the game runs under DOS, so you'll have to reboot to play from Windows 95.

At least Redneck Rampage is delivering something special for those steep system requirements. The sprites are some of the best yet seen in a shooter, and the levels are big and fairly challenging. The game begins in some southern backwater besieged by a combination of snaggle-toothed

mountain folks and alien invaders. Successive levels take place at the drive-in, the sewage plant, the chicken factory, the junkyard, and seven other locations.

There's nothing all that new about the game play: You run around; pick up keys, weapons, and ammo; shoot critters; and blow stuff up. The levels even tend to get somewhat tedious. What makes Redneck Rampage a blast, however, is its outrageous sense of humor. Old geezers walk around shouting, "Get offin' mah land!" Moonshine, whiskey, beer, moonpies, and pork rinds improve your health, though too much of these good things may leave you flatulent and staggering around.

Redneck Rampage has most everything an action game should have (plenty of weapons, interesting creatures, various locations), plus a sense of humor that will either leave you in hysterics or offend you beyond all description. The game is also filled with enough PG-13 language and imagery to warrant a caution. (One monster is actually named "Turd Minion.")

If you're not easily offended and haven't yet had your fill of action games, odds are you'll like your romp through Redneck Rampage.—*T. Liam McDonald*

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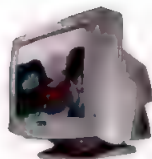
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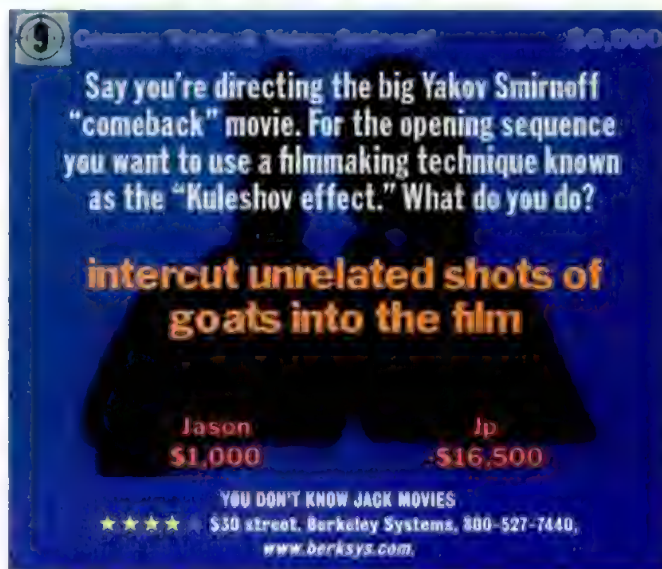
You may have a reserved seat at the local cinema or own enough videos to start your own video store, but as you'll find out from playing this latest release from Berkeley Systems, you still don't know Jack when it comes to movies. Like its predecessors, *You Don't Know Jack Movies* is a challenging, humorous, and irreverent trivia game.

With over 800 new questions, *You Don't Know Jack Movies* challenges your knowledge of just about everyone who's ever worked in the film industry. Actors, producers, movie sound tracks, and other topics blend with a healthy

dose of pop-culture references and sexual innuendo in the kind of atmosphere that made *You Don't Know Jack* such a hit. (One of the categories is "What Kind of Pervert Romances a Stone?")

The questions are as irreverent as ever and feature a lot of the new question types introduced in *You Don't Know Jack Volume 2*, such as *DisOrd* and *Picture Questions*. *You Don't Know Jack Movies* also has a scoreboard to help you keep track of your best scores from game to game.

Our one complaint is that they've switched announcers on us yet again. The original Cookie accounted for much of



what made the original *Jack* game such a riot to play, while the announcer from *Volume 2* sounded too much like a Corey Feldman wanna-be. This announcer is mildly entertaining but sounds as if he's reading his witty one-liners instead of de-

living them off the cuff.

Still, this is a solid addition to a great line of trivia games. *You Don't Know Jack Movies* will keep you entertained but humiliated at the same time. What could be more fun? —Shane Mooney

Flying Closer to Reality

Much better graphics and a bit more realism highlight Comanche's return.

Comanche 3

NovaLogic's original version of *Comanche* was a hit despite—or possibly because of—an arcadelike quality that eschewed true flight simulation. Most notable were its "VoxelSpace" graphics, which used myriad volume pixels rather than wireframes and polygons to create a detailed, flowing world.

Processor power has finally caught up with the concept of voxels, giving *Comanche 3* an impressive look. The game needs some serious horsepower to look its best—a Pentium/133 with 16MB of RAM should suffice—but the quality of its virtual world can't be de-

nied. Buildings don't just blow up, they slowly collapse into the ground, and the explosions

are the best around.

Comanche took a lot of lumps for its patently unrealistic flight models, so NovaLogic tried to make *Comanche 3* more realistic. It largely succeeded, doing a good mid-level simulation comparable to U.S. Navy Fighters but not up to the standards of Long-

bow Gold. Instrument modeling is simple, and flight handling overly forgiving.

Two problems with *Comanche 3* are the unrealistically small size of the game world and the nature of the missions. Waypoints and weapon load-outs can't be altered. Short transit times and tight mission areas give each scenario an arcadelike feel. The missions are few but fairly diverse, and they provide enough action to make up for their flaws.

The game's major weakness is artificial intelligence. Enemies aren't much of a challenge, and your wingman routinely crashes into your helicopter, shoots you, or flies into danger and gets killed. Despite all this, *Comanche 3* offers undeniably entertaining action. Smarter enemies, more missions, and better mission construction would make it even better.—TLM



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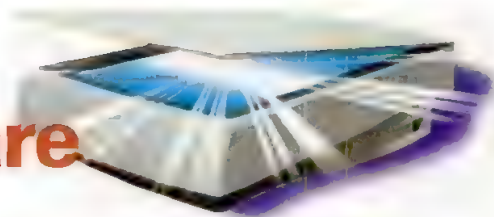
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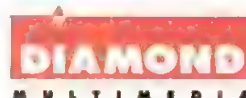


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Coming Up

What's in the Next Issue of *PC Magazine*

Personal Security on the Web

What's going on with your system and your files as you visit all those Web sites and use the Internet to send messages? Don't click on one more OK button until you read about some products that help you surf more privately and safely.

ISPs and Fast Access

Ever in search of the easiest, fastest route to the Net? Here's our latest take on Internet service providers versus online services, plus information on high-speed connections.

Collaborative Filtering

You've probably been to some of the Web sites that ask your preferences, then build on them to recommend other things. We look at how these filtering engines work and why some big sites are investing in them.

Our Picks: The Top 100 CD-ROMs

We recommend the best across the market—from educational and reference CD-ROMs to games and hobby packages.



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PC Magazine, ISSN 0888-9507, is published twice a month except in July and August, at \$49.97 for one year. Ziff-Davis Inc., One Park Ave., New York, NY 10016-5802. Periodicals postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to *PC Magazine*, P.O. Box 54093, Boulder, CO 80328-4093. The Canadian GST registration number is 14049 6720 RT. Printed in the U.S.A.

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NE—Network Edition.

For information about the Network Edition of PC Magazine, call Circulation at 800-289-0429.

Abort, Retry, Fail?

3F-0794-
OWNERS- I NAME

 Accidentally funny AOL passwords keep pouring in, but given the online service's recent troubles, none are more appropriate than this one.

The Long Arm of the IRS

We've all heard that the only two inevitable things in life are death and taxes. But what about taxes after death? The readme file for TurboTax helpfully points out that "new support is added for deceased taxpayers." We're sure they're grateful for the assistance.

Actually, the perfect proofreader is on vacation. (First Byte ad.)

So Much for Higher Education

Jacksonville-based computer retailer Jerry Sinclair reports that there is at least one major state-run university in Florida where the administration purchased several expensive notebook PCs for faculty members and then promptly had them bolted to desks to prevent the professors from taking them home. Our question: How heavy are the desks?



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OK

More Wacky Box-Flap Humor

Disassemble the box for P.I. Engineering's Y-Mouse tablet and mouse adapter and you find this note on an interior box flap: "The product is actual size. The photo is also actual size. However, the product in the photo is not actually actual size." And on the other flap: "The Hidden Flap Manager has noted that the company he works for may not be actual size. In fact, if P.I. Engineering is forced to downsize, the Hidden Flap Manager's supervisor will be fired."

 In case you're working for another 33,000 years. (PC-Xware 5.0.)

If your entry is used, we'll send you \$50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802 or via e-mail to don_willmott@zd.com. Winners this issue: John Hubbling, Mike Paulsen, Steve Plegge, Darryn Rose, Max Rousselot, and Jerry Sinclair.

ILLUSTRATION BY GARY ZAMCHICK

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—WINDOWS MAGAZINE, MAY AND JUNE 1997

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